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The Linacre Lecture

ON

THE AUTONOMIC NERVOUS SYSTEM:

AN INTERPRETATION.

Delivered at Cambridge on May 6th, 1930,

BY WALTER B. CANNON, C.B., M.D., Sc.D., LL.D.,

GEORGE HIGGINSON PROFESSOR OF PHYSIOLOGY, HARVARD UNIVERSITY.

THERE is a distinctive appropriateness in considering here at Cambridge some recent developments of our knowledge of the autonomic nervous system and its interpretation, for here the firm foundations of our knowledge of that system were laid. The careful researches of Gaskell, and of Langley and Anderson—how readily the names are spoken, so often did they appear together in published papers!—the careful researches of these physiologists taught us not only the physiological effects of autonomic nerve impulses, but also the morphological organisation of autonomic neurones. Indeed, the names which they, as pioneers, devised to designate both the new structures and the new functions which they discovered have gone forth from this place and are now employed throughout the world. It was a difficult and intricate problem which confronted them. Happily, their investigations went far towards untangling the complex maze of fibres and responses to stimulation, so that later workers in this realm of physiology have had relatively easy tasks.

In the organisation of the autonomic system a number of features are so peculiar that they at once attract attention and challenge explanation. First there is its field of influence, its typical government of the activities of smooth muscles and glands; and associated therewith the intercalation of an extra neurone between the central nervous system and the peripheral organ. What is the significance of the outlying neurone? Again, there is the arrangement of the connexions between the outlying neurones and the brain and spinal cord in three divisions; and commonly associated therewith a double innervation of the peripheral organs, one nerve-supply from the mid-division and another from either of the end divisions. Why this double innervation? Furthermore, there is the striking fact that the mid, or sympathetic, division can cause the discharge of an internal secretion, adrenalin, which in nearly all respects is capable of producing the same effects on the peripheral organs as the sympathetic nerve impulses themselves. What is the service of adrenalin? And, finally, there are the special conditions under which the several divisions of the autonomic system are brought into action. What do these natural modes of stimulation indicate as to the uses of the autonomic system in the organism? I propose that we discuss these questions.

THE SIGNIFICANCE OF THE OUTLYING NEURONES.

First, then, the question as to the significance of the outlying neurones. It appears certain that one function of these structures is to multiply the channels of distribution. Ranson and Billingsley have counted in the cat the number of pre-ganglionic fibres in the cervical sympathetic trunk and the number of cell bodies in the superior cervical ganglion and they report that the ratio is as 1 to 32. Obviously, if a similar relation exists generally, any single pre-ganglionic axone would bear impulses having extensive effects because of the multiplicity of its contacts with the final distributing agencies.

But does multiplication of the discharging paths tell the whole story? Is there not perhaps a service which the intercalated neurones perform that is peculiarly related to the tissues which they affect? Smooth muscle, for example, rarely responds to a single brief stimulus, though that is highly effective when applied to skeletal muscle; and furthermore, smooth muscle has a much longer latent period and a much slower contraction than skeletal muscle. May not the nerve impulses as discharged from the central system be quite appropriate for skeletal muscle but not for smooth muscle? And may not the outlying neurones, which differ in some respects from all other neurones in the body, act as "transformers," modifying the impulses from the central source and adapting them to the peculiar tissues which they innervate?

This suggestion, put forth about sixteen years ago, was the subject of an investigation in the Harvard Physiological Laboratory by Querido. Using as a test structure the smooth muscle of the nictitating membrane of the cat's eye he found that frequencies of stimulation above and below a certain effective range, when applied to *post*-ganglionic fibres, had no effect or caused submaximal contraction, whereas stimuli of the same frequencies, when applied to *pre*-ganglionic fibres, caused a maximal response. The conclusion was drawn, therefore, that impulses of widely varying frequencies, started central to the ganglion, induce there impulses which pass to the smooth muscle at an optimum frequency. This conclusion was checked by cooling the nictitating membrane and thereby slowing its response. Stimulation of *post*-ganglionic fibres could then be made effective, but only by selecting a frequency of the impulses which was much below the usual optimum. Under those conditions, when the *pre*-ganglionic fibres were stimulated, it was found that no matter what the rate of stimulation, the membrane failed to respond. It is difficult to explain this result except in terms of a relatively fixed frequency of discharge of nerve impulses from the ganglion in response to varying frequencies of impulses coming into it—a frequency of discharge which under the circumstances was too high for the cooled muscle.

Although the results obtained by Querido appear to be clear-cut and decisive, they have been criticised by Veach and Pereira. Contrary to Querido, they obtained the same responses from the nictitating membrane, on both *pre-* and *post*-ganglionic stimulation, with impulses ranging in frequency from 3 to 142 per second. Veach and Pereira did not, however, follow exactly Querido's method, which permitted rapid comparisons back and forth between the two stimulated regions. Also, they did not conduct their investigation by varying the rate of a continuous stimulation, as Querido did, but employed periodic stimulation at the different rates—a method which Querido tried and discarded because it yielded results dependent on the length of stimulation. That point Veach and Pereira seem not to have carefully regarded. They showed, to be sure, that as induction shocks become more frequent they may become less effective because of overlapping, and they suggested that the lessened efficacy of high rates of stimulation in Querido's experiments may have been due to such effects; they did not note, apparently, that Querido explicitly stated that he had ruled out the possibility of that error by "galvanometric control"; further, they did not account for the differences which Querido found between pre- and post-ganglionic stimulation with the *same* frequencies, *whether fast or slow;* and although they proved that the overlapping effect can be overcome by increasing the strength of the primary current they seem not to have noticed that when Querido did precisely *that* the maximally effective frequencies were not raised but lowered. These tedious but pertinent details, though presenting a strong presumption in favour of Querido's results and inferences, still indicate that the question at issue is not settled, and that a clear verification is desirable.

It is surprising that Querido and also Veach and Pereira report that the optimum rate of stimulation of post-ganglionic fibres lies between 120 and 160 impulses per second. That rate is considerably higher than the maximum reported by Adrian and Bronk for the natural discharge of motor impulses to skeletal muscle. In an economical system it would appear that less rapidly acting smooth muscle might well be excited by less frequently recurring nerve impulses, and the less rapid conduction in post-ganglionic fibres, as compared with conduction in motor fibres of skeletal muscle, as well as the longer chronaxie, the longer absolutely refractory period and the longer duration of the action potential, reported by Heinbecker, is in accord with that idea. On the other hand, Kleitman and Chauchard's contradictory observation that the chronaxie of post-ganglionic fibres is much shorter than that of pre-ganglionic fibres could be significant of a more frequent discharge along post-ganglionic axones. We really ought to have, however, direct evidence on this point under natural conditions.

In the present state of our knowledge of the nature of nerve impulses in the autonomic system no decisive conclusion can be drawn regarding the possible function of the outlying neurones as "transformers," adapting the nerve impulses received from the brain and spinal cord to the peculiar visceral structures which are affected. More information is needed. May I venture the suggestion that here lies an attractive realm for research, which may yield highly interesting new facts.

The Double Nerve-supply to the Viscera.

As you have already been reminded, the viscera not uncommonly have a nerve-supply from two sources, from the mid- or sympathetic division of the autonomic system and from the cranial or sacral division. In the management of a skeletal muscle—the biceps, for example—it is quite possible to have all variety of change from extreme contraction to total inhibition by regulating the impulses which pass along its single nerve. Why not a similar control of an internal organ by way of a single nerve supplied to it? A possible answer to this puzzling question can be found by examination of the differences between the distribution of the pre-ganglionic fibres of the sympathetic division on the one hand and of the cranial and sacral divisions on the other.

The pre-ganglionic fibres of the sympathetic division pass out to two rows of ganglia lying each beside the vertebral column. These fibres give off branches to the cell bodies in the first ganglion which they reach, and then they continue to neighbouring ganglia, and thus they form the connexions of the so-called sympathetic "chain." At each successive ganglion the fibres passing through it give off branches to the cell bodies of the outlying neurones. This arrangement provides a highly effective device for multiplying contacts with discharging channels. But it does more than that. The overlapping connexions of the pre-ganglionic fibres, as distributed to the sympathetic ganglia, are such as to result in a *diffuse* discharge of nerve impulses. This view of the mode of action of the sympathetic division is supported by common observation. When a cat, for example, is subjected to excitement or to exposure to cold—conditions which call the sympathetic into action—its hairs are erected from head to tail tip. Deeper observation reveals that the general erection of the hairs is indicative of other general effects on large systems, such as inhibition of the activities of the digestive canal and constriction of blood-vessels. The view that the sympathetic division is organised for diffuse discharge of nerve impulses is confirmed also by the fact that sympathetic impulses evoke a secretion of adrenalin from the medullary portion of the adrenal glands. Since this substance is highly potent in producing, as a rule, the same effects in the organism as sympathetic impulses, and since it has a general distribution in the blood stream, it is clear that, if the sympathetic did not have diffuse effects by other means, it would have them by way of adrenalin. The two factors, however—the nerve impulses and the hormone—commonly work together, as a sympathico-adrenal system, to produce widespread changes in smooth muscles and glands throughout the organism.

How different is the organisation of the cranial and sacral divisions. Here the pre-ganglionic fibres reach into or end near the organs which they affect, and the outlying neurones are merely local agents. Like the nerves supplied to skeletal muscles, therefore, the bundles of pre-ganglionic fibres in the cranial and sacral divisions are distributed in a manner favourable to separate and discriminating action. Thus, constriction of the iris, by discharge through the *motor oculi* when the light is strong, is not associated with an increased salivary flow produced by discharge through the *chorda tympani*, nor with slowing of the heart and increased tone of the alimentary tract by involvement of vagal activity. These various functions of the cranial autonomic nerves can be carried on quite independently of one another—indeed, there is little or no evidence of a diffuse discharge of impulses in them, such as is seen in the complex of nerves forming the sympathetic division.

Associated with the double nerve-supply to the viscera is the interesting fact that, as a rule, the two nerves are opposed in action. Thus, as you well know, the sympathetic influence on the heart is acceleratory, the vagal influence inhibitory; the sympathetic lessens the muscular tension of the stomach, and vagal stimulation increases it. Now, by means of the general *diffuse* action of the sympathetic division and the opposite *particular* action of the several nerves of the cranial and sacral divisions every variety of change is provided for both locally and temporally. *All* the viscera can be affected *simultaneously* in one direction or the other by varying, up or down, the tonic activity of the sympathetic division. And any *special* viscus can be *separately* affected in one direction or the other by varying, up or down, the tonic activity of the special nerve of the opposed cranial or sacral division that is supplied directly to the viscus. The sympathetic is like the soft and loud pedals, modulating all the notes together; the cranial and sacral innervations are like the separate keys. When we consider that the sympathetic, in emergencies, serves in a great variety of ways to preserve the stability of the organism, if that is threatened, the importance of its arrangement for simultaneous and unified action becomes evident.

The Service of Adrenalin.

As already emphasised, the general distribution of adrenalin in the blood stream would assure a general influence of the sympathetic division even if the neurones of that division were not so arranged as to broadcast impulses everywhere, simultaneously, throughout the organism. But the question has been raised, is extra adrenalin discharged into the circulation on special occasions and in amounts which influence the viscera? Over that question sharp controversy has raged for many years. Stewart and Rogoff, although admitting that splanchnic stimulation causes an extra discharge of adrenalin which can affect the viscera, have contended that normally the rate of discharge is fixed, and that it is not altered by asphyxia, afferent stimulation, or emotional excitement—natural conditions which cause splanchnic stimulation. And Gley and Quinquaud, after presenting evidence that the output can be varied—by asphyxia, for example—have declared that adrenalin does not reach the viscera in sufficient concentration to produce any physiological effect. It would be impossible to elaborate, on this occasion, a critique of that long polemic. That I have recently done (in an article in the *Ergebnisse der Physiologie*), and anyone may read the review. It is perhaps sufficient to state here that our claim for a discharge of adrenal secretion in pain and asphyxia has been supported by other investigators, who have used various methods, in England, Russia, Algeria,

Argentina, the United States, and Japan. No one has yet appeared who has confirmed the conclusion of Stewart and Rogoff that the secretion of adrenalin is uniform and invariable. Indeed, Japanese investigators, who have employed the method which Stewart and Rogoff employed, have confirmed our results. And furthermore, when we showed that asphyxia and afferent stimulation caused acceleration of the denervated heart, if the blood flow from the adrenal veins was uninterrupted, but did not do so if the flow was blocked, we used the same procedure which Stewart and his collaborators used to prove that the output of adrenalin is increased by splanchnic stimulation. Logically, therefore, they must either accept our evidence that asphyxia and afferent stimulation augment the output or surrender their own evidence that splanchnic stimulation augments it, Though our evidence was published about eight years ago, Stewart and Rogoff have not yet resolved the dilemma which was presented to them. I see no other conclusion to draw from the evidence in hand than that afferent stimulation, asphyxia and emotional excitement—as well as cold and hypoglycæmia, as we shall see—cause a quick and abundant secretion from the adrenal medulla.

There are many observations which prove that adrenalin reaches the viscera in amounts or concentrations capable of influencing them. The effects of extra adrenal secretion on the denervated salivary gland, iris, heart, and kidney, and in experiments with a crossed circulation, need only to be mentioned to recall to your memories the wealth of this evidence. Indeed, Gley has himself admitted an "adrenalinemia" of an effective character. That aspect of the controversy, therefore, appears to be settled in principle.

Granted that adrenalin is produced in extra amount under special circumstances, what services does it perform? First, as is generally admitted, adrenalin coöperates with sympathetic impulses to produce the same effects which they produce. Though in some conditions the impulses can induce the changes quite as obviously without the aid of circulating adrenalin as with it—on the heart and blood-vessels, for example—the evidence is not yet clear that the impulses normally produce maximal effects without that aid or that they are not materially supported by it. There are indications also that circulating adrenalin prolongs the effects of sympathetic activity. We have reported a continued acceleration of the denervated heart, during nearly a half hour after one minute of excitement, although the animal, after the momentary disturbance, was resting serenely on a cushion. Furthermore, there are observations that in some respects the secreted adrenalin has an efficiency far beyond that of the sympathetic impulses. For example, asphyxia, reflex stimulation, normal emotional excitement, and the sham rage which follows decortication of the cerebral hemispheres, are associated with hyperglycæmia. This is fully as great in animals with the liver nerves severed and with the adrenal glands undisturbed as it is in animals normal in that respect. On the other hand, if the adrenal glands are removed or inactivated and the liver nerves left intact, the hyperglycæmia is diminished or entirely lacking. Quite possibly the action of adrenalin in causing a faster coagulation of the blood and a faster metabolism, as well as its influence in abolishing the effects of muscular fatigue, is wholly independent of any coöperation with sympathetic nerve impulses. The relative services of adrenalin and the nerve impulses need to be studied further, however, before their respective rôles in the functioning of the viscera can be assigned.

THE GENERAL SERVICES OF THE AUTONOMIC SYSTEM.

As suggested earlier, we are likely to obtain insight into the various functions of the autonomic system in the organism by considering the special circumstances under which its several divisions are brought into action and also the special effects which each produces. We shall survey the three divisions separately.

The Sacral Division.—The functions of the sacral division may be summarised by the statement that they consist of a group of reflexes for emptying hollow organs which are periodically filled. Thus, sacral autonomic impulses cause contraction of the rectum and distal colon and also contraction of the urinary bladder. In both instances the effects are induced reflexly by a stretching of the tonically contracted viscera by their accumulating contents. Distension of the seminal vesicles, though associated with more elaborate reactions, stimulates the *nervi erigentes* of the sacral division, and may thereby result in behaviour which reflexly leads to a discharge of the accumulated fluid. To what degree the contractions of the distended uterus can be brought into this scheme is not quite clear. According to Langley and Anderson the sympathetic, not the sacral, division innervates the uterus. The fact that parturition can occur normally in the absence of the sympathetic division indicates either that there is an intrinsic government of uterine contractions which is quite adequate, or that there are influences working by way of sacral fibres which have not yet been traced.

Although simple distention, and reflex response thereto, is the commonest *modus operandi* of the sacral division there are other ways in which it is roused to action. Great emotion—fear, for example—which is attended by nervous discharges through the sympathetic division may be attended also by discharges over sacral pathways. The involuntary voiding of the bladder and lower gut in times of intense excitement is a well-known phenomenon both in man and other animals. And the power of sights and odours and libidinous thoughts to disturb the region controlled by the *nervi erigentes* shows that its function is subject to its own special affective states.

Cranial Division.—The functions of the cranial division, like those of the sacral, can be summarised as mainly a group of reflexes—reflexes protective, conservative, and up-building in their service. By narrowing the pupil of the eye the cranial division protects the retina from excessive light. By providing for the flow of saliva and gastric juice and by supplying the muscular tone necessary for the periodic contractions of the alimentary canal it assures the essential basis for proper digestion and absorption of the energy-yielding material required for all bodily activity. By vagus control of insulin secretion it may play a rôle in the storage of glycogen in the liver. Further evidence of its conservative value is seen in the assurance of time for rest and recuperation of cardiac muscle by the tonic vagal slowing of the heart-rate.

The cranial division, like the sacral, has uncomplicated reflexes, such as the narrowing of the pupil, and likewise activities associated with affective states. The pleasurable taste and smell of food are accompanied by the so-called "psychic" secretion of the digestive juices, and by a tonic contraction of the stomach and intestines. Furthermore, the two divisions—sacral and cranial—are similar in being largely subject to interference by striated muscle. Contraction of the bladder and rectum can be aided or frustrated by impulses from the cerebral cortex, much as the reactions of the pupil can be induced or modified by voluntary acts. Indeed, as a rule, the workings of the sacral and cranial divisions involve the coöperation of the cerebro-spinal nervous system to a much greater degree than do the workings of the sympathetic division, because they are much concerned with external orifices surrounded by striated muscles.

Sympathetic Division.—As preliminary to the discussion of the services of the sympathetic division to the organism I wish to recall a signal contribution to physiology made by Claude Bernard about 70 years ago. He pointed out that we do not live in the atmosphere that surrounds us—we are separated from that atmosphere by a layer of dead cells or by a film of mucus or of salt solution. All that is alive within these lifeless surfaces is immersed in the fluids of the body, the blood, and the lymph, which form an internal environment. Striking instances of the

dangers which arise when the internal environment, or *fluid matrix*, is markedly altered clearly demonstrate the primary importance of keeping it as constant as possible. A relatively small rise of body temperature, a reduction of blood sugar to half its common percentage, a shift of the pH of the plasma slightly up or down, may be attended by disaster. As Claude Bernard explicitly stated, the preservation of constancy is the condition for free and independent life. A glance at lower vertebrate forms reveals the truth of that statement. The amphibian, for example, is not free in either water or air; if it remains in water it asphyxiates; if it remains in air it desiccates. Furthermore, it cannot control its temperature, and therefore it is rendered inactive by the onset of winter. The next higher forms, the reptiles, are likewise dependent on external warmth for their activity. When winter approaches they become cold and sluggish. They have, however, acquired the ability to retain the bodily fluids and therefore can move away from water sources without promptly drying. In still higher forms, in birds and mammals, not only are bodily fluids readily conserved, but the temperature is maintained at a fairly constant optimum level. It is evident that in the course of evolution the internal environment has come more and more under control of agencies which protect it and keep it constant, and that concomitantly the evolving organisms have become more and more independent of the shifts of outer circumstance.

Freedom from External Influences.

Bernard and others laid particular emphasis on this freedom from *external* influences which is provided by assuring constancy of the fluid matrix of the body. It is well to recognise that as control of the fluid matrix is gradually attained the organism is freed not only from variations in the outer world, but also from disturbances arising from the intrinsic activities of the organism itself.

The comfortable and liberating constancy, or *homeostasis*, of our internal environment is secured only by the operation of nice devices which normally are ready at all times to prevent catastrophe. A brief survey will reveal the nature of these devices. External injury may open blood-vessels and allow the fluid matrix itself to escape. Coagulation of the blood appears, however, as a conservative agency. And by reason of pain, or the partial asphyxia which results from hæmorrhage, the sympathico-adrenal system is roused to action; thereby the efficacy of coagulation as a means of stopping the hæmorrhage is increased by an acceleration of the clotting process. If, perchance, hæmorrhage occurs to such a degree that there is considerable loss of blood, the sympathico-adrenal system is further serviceable; it constricts the peripheral vessels, thus diminishing the flow in regions where the bleeding is likely to be great, and thus assuring, also, a continuous supply of blood to essential and constantly active organs, the brain and the heart.

Again, there may be external cold which withdraws heat from the organism and thereby threatens a lowering of the temperature of the internal environment. The sympathico-adrenal system promptly acts to check the danger. It constricts peripheral blood-vessels and thereby lessens the exposure of warm blood to the surface. It causes erection of hairs and feathers, in animals provided with these means of protection, so that a layer of poorly conducting air surrounds the body. Furthermore, by discharging adrenalin into the circulating blood it increases the speed of the oxidative processes at a time when extra heat is needed to keep the temperature from falling.

Or there may be a reduced oxygen supply to the organism, either because of resort to high altitudes, or because of hæmorrhage, or because of the action of poisons, as, for example, carbon monoxide. Once more the sympathico-adrenal system comes to the support of homeostasis. The heart is made to pump the blood more abundantly into constricted vascular areas in the splanchnic and peripheral regions, the blood pressure rises, and the flow becomes faster in essential and sensitive structures. In addition, as Barcroft has so beautifully proved, the spleen is made to contract and discharge myriads of extra red corpuscles for the service of the organism. By these activities of the sympathetic system what might be a serious disturbance is minimised to an important degree.

As I have mentioned above, however, homeostasis of the fluid matrix of the body may be altered not only by external conditions, but also by internal conditions, which, if not guarded against, result in profound disorders. Among the disturbing internal conditions vigorous muscular work stands forth prominently. Let us review the changes caused by intense labour and see how they are prevented from altering the fluid matrix.

Prolonged muscular activity, such as running, markedly reduces blood-sugar, and may deplete the liver of its store of glycogen. The blood-sugar must not be permitted to fall to a dangerous degree—if it is reduced to about 45 milligrammes per cent. (as shown by extirpation of the liver or by use of insulin) convulsions result; and if the reduction is not checked, coma and death follow. Before the convulsive stage is reached, however—and even in the absence of muscular work—the sympathico-adrenal system is brought into operation and sugar is liberated from storage. And so much sugar is thus set free that, if the condition producing hypoglycæmia is not overwhelmingly effective, the danger is passed, and then the sympathico-adrenal system subsides into inactivity. Thus, in spite of great demands for sugar from labouring muscles the glycæmic level is assuredly maintained above the region of serious danger.

Vigorous muscular activity is associated with the development of heat. In prolonged and supreme effort, when the great muscle masses of the body are employed, the amount produced may be very large. Unless this extra heat is dissipated, the temperature of the internal environment may rise to a perilous height. As a consequence of exertion temperatures in man have risen as high as 40·5° C. A rise of two degrees more, if prolonged, might bring serious results because of effects on sensitive cells in the brain. As an automatic protection against that danger the sympathetic system is called into service. Peripheral vessels are relaxed, sweating becomes profuse, and the discharge of heat is greatly accelerated. Thus, a rise of temperature is quickly met and counteracted and the harmful effects of hyperthermia are obviated.

When one engages in strenuous muscular work there is a tendency for the reaction of the blood to shift towards the acid side of neutrality, as a consequence of the metabolites resulting from contraction. This appearance of acid is not without danger. As is well known, in pathological states a condition of acidosis may develop to such an extent that the functions of the nervous system are impaired, and, if the situation is not rectified, coma and death supervene. Long before that stage is even approached, as an effect of muscular effort, corrective and protective processes are started and are vigorously maintained. The important features in the strategy are, first, a prompt supply of extra oxygen to burn non-volatile lactic acid (which otherwise persists and makes trouble in the blood) to volatile carbonic acid which can be rapidly discharged; and second, a faster and deeper breathing so that carbon dioxide is driven away from and extra oxygen is drawn into the lungs. In short, the circulatory and respiratory mechanisms must work at their maximal capacity. Again, the sympathico-adrenal system steps in and saves the fluid matrix from grave disturbance. The circulatory adjustments—constriction of the splanchnic vessels, acceleration of the heart, discharge of extra corpuscles from the spleen—are all made by means of the sympathico-adrenal system. And in addition, this system probably plays a rôle in facilitating the respiratory processes, for, as has been

demonstrated, it can quickly and effectively cause dilatation of the bronchioles and thus reduce the frictional resistances of the to-and-fro movement of the respired air. By these various services the sympathico-adrenal system helps greatly to preserve the homeostasis of the acid-base relationship in the blood, at times when it is dangerously threatened.

The foregoing survey has shown that not only states of the *external* environment itself, but *responses* of the organism to situations in the external environment, are associated with disturbances of the *internal* environment. This personal, individual climate, which we each carry about with us, must not change if we are to continue to be effective. In order that the constancy of the internal environment may be assured, therefore, every considerable change in the outer world and every considerable move in relation to the outer world, must be attended by a rectifying process in the hidden world of the organism. The chief agency of this rectifying process, as we have just noted in many illustrations, is the sympathetic division of the autonomic system.

Removal of the Sympathetic Division.

Having laid emphasis on the great importance of the sympathetic, or sympathico-adrenal mechanisms, may I now tell you something about the physiology of animals from which this part of the autonomic system has been removed. The aggregation of the nutritive centres (the cell bodies) of the outlying neurones in ganglionic chains, especially in the chest and abdomen, where direct connexions with the spinal cord are present, permits a thorough extirpation of the sympathetic division. If the ganglia are removed, the post-ganglionic fibres must degenerate. And, as Langley showed, the pre-ganglionic fibres, coming from the central nervous system, are incapable of making effective connexion with organs normally innervated by post-ganglionic fibres. Removal of the sympathetic chains, therefore, must result in a permanent disconnexion of these organs from central nervous control.

In removing the sympathetic chains we have used two methods. At first we took out the cervical, the thoracic, and the abdominal portions separately. The defect of that method lay in an occasional failure to excise one or two ganglia in the lower thorax, close to the diaphragm. To avoid that possibility we later removed the thoracic and abdominal portions, from the stellate ganglia to the ganglia beyond the rim of the pelvis, in an unbroken condition. There is no possibility of question that the entire sympathetic system, as a functioning agency, is thus extirpated. The qualification, "as a functioning agency," is used because the cervical sympathetic still remains in place. The pre-ganglionic fibres for the cervical sympathetic ganglia, however, pass through the stellate ganglia on either side, and consequently the removal of the stellates necessarily disconnects the cervical ganglia from the central nervous system. That the cervical sympathetic ganglia do not function under these circumstances is proved by extirpating the stellate on one side, and later exciting the animal or exposing it to cold. The hairs rise on only one side of the head; they do not rise on the side deprived of its stellate, although they are still innervated by the post-ganglionic fibres from the isolated cervical ganglia. It is clear, therefore, that removal of the thoracic and abdominal portions of the sympathetic strands over the range of their connexions with the spinal cord completely eliminates sympathetic control of the viscera.

The first fact which strikes the observer of sympathectomised animals—cats, dogs, and monkeys—is that they continue to live without apparent difficulty. It is immediately surprising that the so-called "Lebensnerven" can be so largely destroyed without producing marked and obvious changes and definitely jeopardising existence. Numbers of these animals have lived many months, some more than a year, before being sacrificed; and one of them, now comfortable in the laboratory, has had no effective sympathetic system since Oct. 10th, 1927.

These facts definitely contravene certain views, put forth by previous workers, concerning the importance of some parts of the system. Meltzer, for example, removed the superior cervical ganglia from rabbits and cats, and because of the very high mortality he concluded that those ganglia contain a principle which is essential for the maintenance of life. His views receive no support from our observations. Later Spadolini declared that complete and extensive extirpation of the mesenteric nerves of the cat is incompatible with continued existence. He observed a general depression in his animals, grave wasting, the lowering of body temperature, and severe lesions of the gastro-intestinal tract. Although we have removed the abdominal sympathetic chains, including the splanchnic nerves, from more than one hundred cats, and although we have taken from some of them the semilunar ganglia and have even stripped the nerve strands from the cœliac axis and the superior mesenteric artery, we have never seen any serious symptoms as a consequence of the procedure. Finally, Abel has urged that chromophil tissue—possibly that which is associated with sympathetic ganglia—is essential to life. We have, however, removed all the sympathetic ganglia from the superior cervical to the pelvis, we have dissected out the semilunar ganglia, we have excised the right adrenal gland and sucked away the left adrenal medulla. The animal lived thereafter in evidently normal health for many months. At autopsy there was proof of the thorough character of the operations. No chromophil tissue could have remained. From all these observations we are driven to the conclusion that no part of the sympathetic system—superior cervical ganglia, mesenteric nerves, or chromophil tissue—nor the system as a whole is of vital importance for the individual.

You might think that the vegetative system would be important for growth. We have, however, performed unilateral sympathectomy in young kittens and permitted them to grow to adult size. Thereafter we have killed them and compared the weights of various bilaterally symmetrical organs and parts, including bones. There was no demonstrable difference between the two sides. It appears, therefore, that the sympathetic system is not concerned with the growth of the skeleton or of internal organs.

We have made careful observations on the basal metabolism before operation and after removal of each of the three portions—cervical, thoracic, and abdominal—of the sympathetic chains. Usually there is a slight fall of the metabolic rate after sympathectomy. In our experience this has been most persistently observed after excision of the cervical portion. As a rule, however, the operation does not reduce the metabolic rate more than 10 per cent. Indeed, the reduction may be regarded as negligible.

Recent discussion of possible sympathetic control of the tonus of skeletal muscle and of the service of the sympathetic in resisting fatigue raised the question as to the influence of sympathectomy on muscular function and performance. After unilateral sympathectomy the knee-jerks on the two sides were not demonstrably different. Also after unilateral extirpation of the lower abdominal chain in a dog which had been trained to run in a treadmill, there was no reduction in the total performance of the animal, nor was there any notable difference of action of the two hind limbs.

Defects shown by Sympathectomised Animals.

So much for the failure of sympathectomy to produce striking alterations in the body. Now let us turn our attention to the defects shown by animals after the operation.

In a paper published last year we reported that sympathectomy does not prevent the female from performing the functions of reproduction and lactation. The observation on which that report was based was

made on an animal from which the last portion of the sympathetic system was taken only a short time before the birth of her young. This animal did, indeed, nurse one of her two offspring until it was capable of foraging for itself. Later, however, another cat, from which the sympathetic had been removed about twenty months, gave birth to three kittens. The surprising fact appeared that the breasts were not prepared for lactation, and in spite of our efforts the young died from inanition; or from inanition and lack of maternal care, for the mother was utterly indifferent to her offspring. More recent observations have shown that in the dog also a belated effect of sympathectomy is a serious disturbance of the function of the mammary glands.

When animals are totally sympathectomised there is a great reduction of their ability to work. We have completely excluded the sympathetic system from action in a dog which had been trained to run in a treadmill until exhausted. With a standard rate of movement of the treadmill the running lasted approximately two hours, interrupted towards the end by brief periods of rest. After sympathectomy the capacity of the animal to work was reduced about 35 per cent. Of course, the vagus nerves were still intact, and by a reduction of vagal tone the heart could be moderately accelerated. Observations on another animal in which the denervated heart could be only slightly accelerated, and associated therewith there was a great reduction of the animal's ability to run, indicate that much of the retained ability of the sympathectomised animal was due to the cardiac acceleration. Nevertheless the redistribution of blood in the body, the rise of blood pressure, the dilatation of the bronchioles, and the liberation of adrenalin—all possible concomitants of muscular effort and all favourable to prolonged and efficient performance—had been rendered impossible by removal of sympathetic control; and the absence of these important factors must be added to the deficiency of the heart as determining the failure of the sympathectomised animal even to approach his former standard of achievement.

In addition to the lack of adaptative changes in the circulatory system, there is total paralysis of the mechanism for liberating sugar from the liver. This fact was brought out by determining the effect of emotional excitement on blood-sugar before and after sympathectomy. In our experiments excitement, varying between three and ten minutes, caused in normal animals an average increase of blood-sugar of 34 per cent. In sympathectomised animals, on the other hand, a similar duration of excitement resulted in no constant rise of the glycæmic level. As earlier observations had revealed, animals deprived of this regulatory arrangement are extremely sensitive to insulin.

Associated with other evidences of failure of the sympathetic system to operate there is a lack of the normal increase of red blood corpuscles that attends excitement. This absence of polycythæmia is due to non-coöperation of the spleen. All these features—the circulatory deficiencies and the abolition of the mechanisms for liberating blood-sugar and for discharging extra erythrocytes—doubtless work together to bring about the reduced efficacy of the sympathectomised animal when required to make a muscular effort. It must be admitted that many of the details of this picture need to be worked upon further before definite quantitative statements can be made, but its main features are, I believe, as I have stated them.

Not only are sympathectomised animals defective in the performance of muscular work, they are also defective when exposed to cold. The pilomotor muscles are not under control and the hairs are not erected. The smooth muscles of the blood-vessels are likewise no longer under nervous government. Cold has no local contractile effect on either of these structures. For these reasons there is no check on heat loss from the body. Furthermore, the organism has been deprived of the service of an increased secretion of adrenalin to accelerate heat production when the body temperature tends to fall. The sympathectomised animal, therefore, when confronted by the problem of maintaining a normal temperature when it tends to fall, is physiologically inefficient. The behaviour of such an animal in cold weather is in accord with this inefficiency. It exhibits marked antipathy to cold air and to draughts. During the winter it lives almost continuously in the neighbourhood of sources of heat, leaving them only long enough to obtain food.

To test the physiological abilities of sympathectomised animals to control the body temperature we placed them in a cold room, ranging between 0·8° and 6·0° C., and made periodic observations on their rectal temperature and their shivering reactions. In some instances the tests were carried out on the same animals before and after the operation. In the normal state exposure to the cold caused no noteworthy change in the rectal temperature. After sympathectomy there was a rapid drop of the temperature when the animals were placed in the cold room. This was associated with a much greater frequency and prominence of shivering than in normal conditions, and the shivering in turn was associated with a check in the temperature drop. Since shivering was the only resource, except exercise, that was left to protect the animals from a grave hypothermia, the maintained low temperature probably indicates an equilibrium between the heat lost to the cold surroundings and the heat produced by the shivering process.

Sympathectomised animals have difficulty not only when exposed to cold but also when exposed to heat. In order to prove that an animal which takes the upright position may survive sympathectomy, we removed the sympathetic chains from monkeys. For the purpose of giving a group of these animals (among which was one on which we had operated) the benefit of sunlight and fresh air, we placed them in a cage in the yard near the laboratory last July. The normal monkeys were not at all disturbed by the heat. The monkey without the sympathetic chains, however, was found in a short time lying prostrated and gasping; it had a very high temperature and, indeed, succumbed from heat stroke.

In surveying the results of the observations on animals which survive the exclusion of sympathetic nerve impulses you may be more impressed by the slight effects of the operation than by the actual deficiency phenomena. A little thought, however, will show that the slight effects may be misleading. The sympathectomised animals, to be sure, continue to live, but they live within the protective confines of the laboratory, where there are no marked temperature changes throughout the year, no necessity of struggle for food, no requirement of escape from enemies, no danger of hæmorrhage—indeed, where there is a very special and limited sort of existence. Judging by behaviour under such conditions one might reasonably draw the inference that the sympathetic system is of minor importance for the proper functioning of the body. We believe, however, that the inference would be erroneous. If these animals were set free in the outer world and had to meet its requirements of struggle, there would be no delivery of sugar to the blood according to need, no polycythæmia, no splanchnic vaso-constriction with consequent rise of blood pressure and faster blood flow, no great acceleration of the heart, no shifting of the circulation to benefit the contracting muscles, no secretion of adrenalin to hasten coagulation and to abolish the effects of fatigue. The deficiencies of the sympathectomised animal are clearly revealed when it is exposed to cold or heat. If exigencies arise it is unable to preserve the constancy of its internal environment.

CONCLUSION.

The foregoing survey emphasises a distinction, which has long been recognised, between the "voluntary" and the "involuntary" or "vegetative"

functions of the nervous system. It is desirable to remove from physiology terms having psychological and botanical implications. The nervous system has two relations—toward the *external* and towards the *internal* environment. This fact naturally suggests that a distinction might be based on these oppositely directed functions. The "voluntary" system, which is elaborately provided with exteroceptors and with muscles which operate bony levers, is arranged for altering the external environment or the position of the organism in that environment, by labouring, running, or fighting. These activities may be appropriately regarded as exterofective functions, and the "voluntary" system may therefore be called the *exterofective system*. As we have seen, however, exterofective activities necessarily produce coincident, and possibly highly disturbing changes in the internal environment. Under these circumstances the "involuntary" nervous system plays its part by acting upon the heart, smooth muscles, and glands in such ways as to keep the internal environment constant and fit for continued exterofective action. This interofective action of the "involuntary" or "vegetative" nervous system justifies calling it the *interofective system*. Inactivity of the exterofective system establishes a basal state for the organism because minimal functioning of that system is accompanied by minimal functioning also of the interofective system. Exterofective action is mirrored in interofective action, which rises as the internal disturbance rises and subsides as the disturbance subsides.

The interofective system has just been referred to as if it were single, instead of consisting of the three divisions of which I have already reminded you. If we apply to these three divisions the idea that the function of the interofective system is to preserve *homeostasis*—that is, stability and constancy of the internal economy—we can, without *great* alteration of previous considerations, give a common interpretation to the services of all three divisions. The sacral division, as a group of reflexes for emptying hollow organs, preserves constancy by getting rid of waste and by discharging accumulations which disturb or check the free action of the individual. Incidental thereto the race is assured continuance. The cranial division, as a group of reflexes protective and conservative in function, is more obviously concerned with the preservation of uniformity in the organism; in so far as its main services are involved, those of regulating digestion and absorption of energy-yielding material, it is of fundamental importance for the maintenance of steady states. The sacral and cranial divisions, however, operate only indirectly and somewhat remotely to assure constancy. It is the middle or thoraco-lumbar division of the interofective system which acts promptly and directly to prevent serious changes of the internal environment. By mobilising the bodily reserves and by altering the rate of continuous processes this division operates to keep uniform the fluid matrix of the organism and therefore may properly be regarded as the special and immediate agency of homeostasis.

In offering you this interpretation of the services of the autonomic system I am aware that in many respects it is quite deficient and inadequate. Repeatedly I have had to remark that we need more light before we can see clearly the nature of the functions which are performed by that system. Perhaps, however, the point of view which I have taken may not be the same as yours, and the somewhat different way of regarding familiar facts may lead to new ideas and new researches. If what I have said should have that effect I should be most gratified.

MEDICAL APPOINTMENTS FOR WOMEN. — The Central Public Health Committee of the London County Council has decided that appointments to the hospitals and district medical services which have passed into their control under the Local Government Act shall be open to women as well as to men doctors.

THE CAUSATION OF ECLAMPSIA.

OBSERVATIONS AND EXPERIMENTS.

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ECLAMPSIA is still the "disease of theories," but it is generally attributed, at any rate in this country, to a toxin formed in the placenta. I do not think that this can be the correct explanation.

Eclampsia is, of course, a syndrome rather than a specific disease. It is usually associated with fits, coma, a high blood pressure, and albuminuria, and often with hæmaturia, and is commonly preceded for some days by malaise and albuminuria. But it may prove fatal without any fits being observed, and there may be no coma. I have seen two fatal cases in which the blood pressure was so low that it could not be recorded, and I have also seen one case in which the secretion of urine was free and no albumin could be detected in the urine until after the nineteenth fit, and two cases in which the symptoms came on suddenly in patients under observation in the antenatal ward.[1]

Geographical Incidence of Eclampsia.

The features and circumstances of the disease vary greatly in different parts of the world. Oxley[2] has recently reported that among the last 10,000 consecutive confinements at the East End Maternity Hospital only one woman developed eclampsia.

He states, moreover, that the vast majority of pre-eclamptic patients may be so improved within 24 hours by rest in bed, purgation, and water diet that they are no longer in danger of developing eclampsia. During the last four years, he informs me, only two or three such patients failed to improve, so that induction of labour was imperative. This testimony can be endorsed by all those who have tried this treatment initiated and carried out with such conspicuous success at the Rotunda Hospital.

Cruickshank, Hewitt, and Couper[3] report that 3·6 per cent. of all the admissions to the Glasgow Maternity Hospital are diagnosed as eclampsia. In other words, 360 patients out of the last 10,000 confinements at that hospital have had eclampsia. I am well aware that the institution serves a wide area and that a high percentage of the patients admitted are abnormal; but, nevertheless, the incidence of the disease is extraordinarily high in such places as Glasgow, Dundee, Kirkcaldy, and Kilmarnock. Comment on a ratio of 360 : 1 is clearly superfluous.

It is well known that the incidence of eclampsia in Germany declined very markedly during the war. H. v. Heuss[4] and others have shown that its incidence in that country is closely related to certain meteorological conditions and that it is largely a disease of cities. I have recently pointed out[5] that the incidence of eclampsia and all the toxæmias of pregnancy is extremely low in Siam, and relatively low in Southern China, in most areas of India, in the Persian Gulf, Iraq, Syria, Palestine, and Egypt. It is noteworthy that in the same areas, with their teeming millions, gastric ulcer, diseases of the gall-bladder, carcinoma of the intestines, and appendicitis are also but infrequently encountered.

Theories of Causation.

I submit that these facts by themselves disprove the placental toxin hypothesis. I cannot believe, either, that the Siamese placenta is less toxic than the Scottish placenta or that the anæmic women of Siam are more successful in providing themselves with an

antitoxin than the robust women of Scotland. It is, moreover, impossible to explain how a diffusible toxin formed in the placenta can poison or kill the mother and allow at least half the full-term children of such women to be born alive and thrive.

The only serious attempt to correlate pathological changes in the placenta with the disease has been made by Young,[6] who holds that it is caused by the products of autolysis in a placental infarct which are absorbed only if the main body of the placenta remains attached to the uterine wall. I submit that his hypothesis is untenable for the following reasons:—

1. Infarcts of the placenta are exceedingly common and were found by Siddall and Hartman [7] in 67·7 per cent. of the placentæ they examined from 700 consecutive confinements.
2. The hypothesis cannot explain how patients may recover from ante-partum eclampsia and give birth some weeks later to healthy full-term children; neither can it explain the ætiology of post-partum eclampsia.
3. Placenta prævia is but seldom associated with toxæmic symptoms.
4. Young's experiments offer no conclusive evidence in support of his theory.
5. I shall show that it is disproved by experiments I have carried out.

Young injected products from human placentæ into the subcutaneous tissues of guinea-pigs and so caused convulsions, focal necroses in the liver, and parenchymatous degeneration of the kidneys. He assumed these three effects to be the cardinal criteria of eclampsia. It is, however, well known that eclampsia may occur without convulsions or albuminuria; nor does it always cause specific necroses in the liver. In 1889 Wooldridge[8] reported that he had caused intravascular clotting and hæmorrhagic necroses in the liver by injecting extracts of tissue fibrinogen into dogs. Schmorl[9] repeated his experiments and satisfied himself that this substance when injected into dogs caused not only the typical hæmorrhagic necroses in the liver, but also the changes in the lungs, kidneys, and brain which he associated with eclampsia. In 1929 Dieckmann,[10] apparently unaware of these experiments, injected tissue fibrinogen into dogs and obtained similar results. I have myself injected subcutaneously into a guinea-pig powdered ox lung prepared in the manner described by Dr. Young. The animal died in convulsions after two injections. The liver showed severe degenerative changes and small hæmorrhages, and the kidneys a cloudy swelling of the convoluted tubules.

I have recently had the opportunity of examining sections from the livers of 44 patients who died from eclampsia in different centres in the British Isles. No hæmorrhages were found in 14 out of the 43 cases, and the typical fibrino-hæmorrhagic necroses were present in only 24. Moreover, typical fibrino-hæmorrhagic necroses were found in the liver of a patient who died from post-partum hæmorrhage in whom no evidence of toxæmia was noted during several days in hospital. It is, therefore, clear that the so-called typical hepatic lesions occur in only about 30 per cent. of fatal cases of eclampsia, while they also occur in association with the other toxæmias of pregnancy. The one constant finding in all cases of eclampsia and in all the toxæmias of pregnancy were areas of necrosis in the liver, and I am convinced that the pathological evidence supports the contention that all the toxæmias of pregnancy are caused by the same factors.

I do not propose to enumerate all the hypotheses which have been advanced to explain eclampsia for they are well known, and the voluminous literature has lately been reviewed by Stander.[11]

Albuminuria and Pregnancy.

Before developing my thesis, I should like to make a few observations on the kidneys, the main functions of which are to eliminate endogenous waste products and to assist in maintaining the normal pH of the blood.

Lever,[12] of Guy's Hospital, first pointed out the association of albuminuria with eclampsia in 1843. Because it is so easy to detect albumin in the urine and it is impossible to detect moderate damage of the liver, a great deal of attention has been paid to the kidneys by those investigating the toxæmias of pregnancy. It was even thought that eclampsia was synonymous with uræmia until it was shown that the blood-urea and non-protein nitrogen were not appreciably altered in the former disease.

If it can be proved—and it has been proved—that a patient can have eclampsia without having albuminuria, this evidence is of more value than that of 999 cases in which albuminuria does occur. Such a case offers conclusive evidence that neither albuminuria nor any functional defects of the kidneys are necessary concomitants of eclampsia. On the other hand, albuminuria may be found apart from disease.

Nicholson[13] gave a good account of orthostatic albuminuria in schoolboys, and showed that a high protein diet caused not only albumin but granular casts to appear in the urine of certain boys. Collier[14] and others have described albuminuria following severe exercise.

Fischl[15] reviewed the literature dealing with experimental albuminuria and confirmed the statements that albuminuria could be caused in rabbits and dogs by tying them in various positions or by "palpating" a kidney for a minute. He showed that albumin and casts are passed in the urine of a dog or rabbit if it be tied on a table for 40 minutes with a cushion under its back to cause lordosis. If the animal be repeatedly tied in this position it will develop a fatal hæmorrhagic nephritis. He, moreover, showed that the tendency of such animals to pass albumin and the quantity passed could be influenced by the diet given on the days preceding the experiment.

I have succeeded in causing three out of seven volunteers to pass albumin in their urine by placing them in a modified Walcher's position for 30 to 40 minutes. Two passed urine containing a heavy deposit of albumin and the third a specimen which contained a definite cloud. One volunteer, a healthy athletic medical student, is extremely interesting. After the first experiment his urine contained a very heavy deposit of albumin (alb. ++). On the second occasion his urine, which was clear before the experiment, contained a heavy deposit of albumin after he had been in Walcher's position for 10 minutes. The urine again became clear within an hour of the experiment. His urine contains a cloud of urine after tennis or any sustained exercise, but otherwise it has always been clear on the many occasions on which it has been tested. I am convinced that he would suffer from a severe albuminuria were he but to become pregnant. All the specimens were centrifuged and examined microscopically, but neither casts nor abnormal cells were found on any occasion.

It is therefore certain that the position of lordosis maintained for 30 to 40 minutes can cause a healthy man or woman (two of the volunteers were women) to pass albumin in the urine, which disappears shortly after the experiment. The albuminuria is probably caused by traction on the left and possibly on both renal veins, and it is possible that the length of the veins may be one of the factors which decides the amount of lordosis necessary for its production. I have recently shown[16] that rapidly growing benign ovarian tumours may cause albumin and casts to appear in the urine which disappear when the cysts are removed.

Dr. F. R. Winton authorises me to say that he intends to publish in a few weeks the results of some experiments he has been carrying out at University College which show that a reversible albuminuria may be caused by increasing the pressure in the renal vein of an isolated dog's kidney. Albuminuria cannot, however, be caused by increasing the pressure in the renal artery.

Taking these facts together, there is every reason to believe that albuminuria may be caused in a pregnant woman by pressure or traction on the renal vein especially during the latter weeks of pregnancy, when the tumour is big and the woman stands and

walks with her spine in the position of lordosis. It is also reasonable to assume that the albuminuria so often associated with labour may be due to the increased pressure in the renal veins associated with the pains. In any case, it is certain that the amount of albumin in the urine bears but little relation to the extent of the lesions in the kidneys. It is, however, probable that long-continued traction on the renal veins may cause damage to the kidneys. I suggest that pregnant women with albuminuria should lie flat on their faces on a wooden bed in which a hole is cut through which the abdomen may protrude and be supported with suitable straps.

Nephritis and Eclampsia.

The kidneys of women dying from eclampsia show a cloudy swelling, especially affecting the convoluted tubules, and in only a small percentage of cases is there any evidence of nephritis. The lesions in many cases are very slight. It is, therefore, abundantly clear that the kidneys are not concerned in the ætiology of eclampsia and that the lesions found in them are caused either by the toxin which caused the toxæmia or by mechanical factors—or possibly by a combination of both factors. It is, however, more than probable that a nephrosis, however caused, may sometimes develop into a nephritis.

Where pregnancy is associated with nephritis the history, response to treatment, and chemical findings are completely different from those of eclampsia.

A woman is known to suffer from nephritis. She becomes pregnant. The symptoms of the nephritis become more marked, and there is often a miscarriage or premature labour. It may be necessary to perform induction of labour in order to save the woman's life. The nephritis gradually improves after the pregnancy is terminated. She again becomes pregnant, and may first be seen by the physician when she is suffering from a fatal uræmia. Severe symptoms appear earlier with each succeeding pregnancy. She does not have eclampsia but uræmia—and that frequently before the twenty-eighth week of her pregnancy.

It is almost true to say that a woman with obvious nephritis never develops eclampsia. There is no reason, however, why a patient with a mild degree of chronic nephritis should not have eclampsia, and it is possible that the liver may be indirectly embarrassed by such a condition.

Source of Toxins in Eclampsia.

If eclampsia be caused by a toxin and that toxin does not originate either in the fœtus or in the placenta—then it must be absorbed from the bowel. We must therefore explain why the disease should only occur in association with pregnancy.

Pregnancy affects the woman in the following ways:—

1. It causes metabolic changes, the most important of which are: (*a*) The blood volume is increased while its specific gravity is lowered. (*b*) There is a marked increase of fat, lecithin, cholesterol, and fibrinogen in the blood. (*c*) The blood calcium is lowered. (*d*) The proportion of urea nitrogen to non-protein nitrogen in the blood is lowered. (*e*) The alveolar CO_2 tension is lowered and the CO_2 combining power of the blood is decreased. (*f*) The basal metabolic rate is increased. (*g*) The cardiac output is increased. (*h*) The amount of glycogen in the liver and muscles is very much decreased at the end of pregnancy (in dogs).[17] (*i*) The partition of nitrogen in the urine is altered. (*j*) A marked storage of nitrogen occurs in the body.

2. The bulk of the uterus embarrasses the intestines and may cause albuminuria.

3. The mother has to undertake some of the metabolic functions of, and get rid of the waste products of metabolism for the child.

4. The growing fœtus deprives the mother of considerable quantities of such important substances as calcium, iron, iodine, and sugar, and in increasing amounts. The fœtus increases its weight by nearly a third during the last four weeks of gestation, and probably uses in that time about 8 g. of calcium. The total amount of calcium in the maternal blood is about 0·5 g.

I suggest that the causation of eclampsia depends on two main factors—namely, the absorption of toxins from the bowel and a breakdown of the normal defensive mechanism.

Dietetic Deficiency and Pregnancy.

Absorption of toxins from the bowel will depend upon the food ingested and the time its residue remains in the intestines.

In spite of amazing discoveries on the effects of diet—stimulated by the discoveries of Hopkins less than three decades ago—but few physicians realise the significance of dietetics or the vast possibilities it offers in preventive and curative medicine. Deficiency of one or more vitamins in the diet is recognised to be the cause of pellagra, beri-beri, scurvy, Barlow's disease, Pink's disease, rickets, osteomalacia, keratomalacia, xerophthalmia, dental caries, and vesical calculus. Other diseases and morbid conditions, such as pernicious anæmia, sprue, rheumatism, atheroma, cyclical vomiting, gout, urticaria, and certain mental conditions are probably caused by or related to imperfect diets. Constipation—the thief of health, the ally of sepsis, the handmaid of toxæmias, the friend of insomnia, and the builder of piles—is in the vast majority of cases the penalty of an incorrect diet. If infants be included in our review there can be but little doubt that a very high percentage of the ill-health and disease in the world is directly or indirectly attributable to faulty diets.

Most animals, including man, can adapt themselves for long periods of time to incomplete diets, and that is one of the main reasons why their importance is so little appreciated. Moreover, the troubles caused by food deficiencies may take a long time to develop, so that it is difficult to relate cause and effect. The strain of pregnancy often lays bare such deficiencies, and that is why beri-beri is so often associated with pregnancy and osteomalacia, but rarely causes symptoms apart from it. It is possible that the severe neuritis which is sometimes associated with pregnancy in this country may be a form of beri-beri. A certain type of pernicious anæmia is peculiar to pregnancy and is associated with a high mortality. This disease is very prevalent in the Bombay Presidency. It may be invariably "cured"—providing the woman is not seen for the first time when moribund and in labour—by the exhibition of liver extract, and it is, therefore, almost certainly another example of a deficiency disease made evident by pregnancy.

Assimilation During Pregnancy.

It is obvious that a diet has not only to be complete but has to be assimilated. A woman when pregnant needs to provide herself with more calcium, iron, and iodine, and probably a greater amount of vitamins than an ordinary person.

The assimilation of her food may be interfered with by several factors, two of the most important of which are anxiety and the bulk of the uterus.

The influence of the nervous system on digestion has long been known to physiologists, but the implications of these facts have not been adequately realised by the clinician. During the war several observers found that men, afraid of being conscripted, developed a dilatation of the stomach associated with marked disorders of the digestion and with insomnia. The dilatation of the stomach disappeared as the probability of war service receded. Business worries, financial and family anxieties, over-study, nervous exhaustion, however produced, cancerophobia and other fears may, and often do, destroy the appetite, upset the digestion, and disturb the metabolism of the body.

Marriage calls for great adjustment in a woman's mental and physical life, and she often suffers at the very beginning of her married life from mental traumata which produce important, varied, and often ill-recognised sequelæ. Moreover, the fear of pregnancy and what it means, followed by the very natural dread of labour, add to her worries. If at this time she

lacks sympathy and understanding, these and other psychic traumata may upset the digestion and the metabolism of the body. It is evident that unmarried primiparæ are more likely to suffer from these anxieties than those who are married, and this fact alone might account for the higher incidence of the toxæmias which is said to occur in such women.

The bulk of the pregnant uterus undoubtedly tends to cause intestinal stasis, and thus not only prevents food from being assimilated, but causes an increased absorption of toxins. Mills[18] has shown that the complex protein tissue fibrinogen may be absorbed through the intact mucous membrane and be excreted unaltered through the kidneys of dogs and rabbits. It is, therefore, clear that it is not always necessary for proteins to be split into amino-acids before they are absorbed, and it is conceivable that a mucosa damaged by prolonged coprastasis might allow proteins to pass unaltered into the blood stream. Such proteins might be extremely toxic to the body. I have described [16] the serious effects that may be caused by rapidly growing ovarian tumours, and there is no reason why the pregnant uterus should not cause similar symptoms.

Before concluding these remarks on diet I should like to refer to the significance of sunlight. Maxwell[19] has conclusively proved that osteomalacia is caused by a deficiency of vitamin D in the diet, but I think that it is clear that deficiency of sunlight is the ætiological factor of most importance in causing the condition. It is also clear that the sun's rays save the vast majority of people in the East from one or other of the deficiency diseases which would otherwise inevitably result from their diet.

Sunlight, absence of worry, and a diet having a low protein content go hand in hand with a low incidence, both of the toxæmias of pregnancy and diseases of the intestinal canal.

It is well that "bottled sunlight" is available for the peoples of these islands, and it is to be hoped that one or other of the many excellent preparations now on the market will be more frequently prescribed for pregnant women; for it is important to remember that not only may certain diseases and complications of pregnancy be caused by an incomplete diet, but that the health and welfare of the unborn child is affected, probably more than is realised, by the food its mother takes.

Toxæmia and the Protective Action of Calcium.

Having briefly considered the subject of diet and the embarrassment caused to the intestines by the bulk of the pregnant uterus, we are now in a position to study the effects of intestinal stasis and note how the defensive forces of the body are upset by pregnancy.

The lower part of the small intestine and the colon are inhabited by countless billions of bacteria. These bacteria have the important function of causing fermentation and decomposition of those foodstuffs which resist the action of the digestive juices in the higher bowel, and thus allow certain products, otherwise lost, to be absorbed by the body. This decomposition, should it proceed too far, ends in putrefaction and the formation of such toxic substances as acetic and lactic acids, and the aromatic compounds indol, skatol, cresol, and phenol. Added to these toxic substances are the endotoxins, liberated by the dead bacteria. It has been estimated that an adult person passes some 480,000,000,000 bacteria in a normal stool, so that it may be assumed that the amount of these endotoxins absorbed is in some circumstances far from inconsiderable.

Indol and skatol are oxidised to form indoxyl and skatoxyl and are then conjugated in the liver capillaries with potassium sulphate to form potassium indoxyl and skatoxyl sulphate. It is believed that the other toxins are in some manner not yet understood rendered harmless to the body in the liver. I propose to offer evidence that calcium is the most important substance concerned in protecting the body against these and other toxins, although I do not wish to minimise the importance of the vitamins or the significance of such substances as iron or iodine.

Calcium is by far the most abundant metallic element in the body and is found in all of its cells and fluids. It is present in animal and vegetable foods partly in loose combination with albumins of an acid character, but to a much greater extent in the salts of phosphoric and carbonic acids. It is mainly excreted through the bowel, but the proportion excreted through the kidneys is raised if the urine be markedly acid. There are usually about 10·2 mg. of calcium in 100 c.cm. of blood-serum. Calcium is controlled in the body by the parathyroids but can only be properly utilised if a sufficient supply of vitamin D be assured.

King and Stewart[20] showed in 1909 that the bile-pigments and not the bile-salts caused the toxic symptoms of obstructive jaundice, and that calcium combined with these pigments and rendered them non-toxic. This work was confirmed by King, Bigelow, and Pearce[21] in 1911. They found that calcium protects the organism against the toxicity of bile-pigments, but at the same time depletes the reserve of calcium in the tissues and causes its increased elimination. There may be an actual increase in the total calcium present in the blood, but much of it is combined with bilirubin so that the result is a decreased concentration of ionised calcium.

P. D. Lamson has for some years been directing research on the toxicity of carbon tetrachloride. He and his associates while working at Johns Hopkins University found it impossible to produce visible signs of intoxication in dogs by the oral administration of carbon tetrachloride, even when given in doses up to the capacity of the stomach (250 c.cm.). The usual dose given to an adult is 3 c.cm. In 1925 the work was transferred to the Vanderbilt University Medical School, and Minot[22] states that "in striking contrast to the results obtained at Johns Hopkins University the dogs at Vanderbilt University died after a dose of 4 c.cm. of carbon tetrachloride per kilo of body-weight." These dogs lost their appetite and either became unconscious or developed muscle twitchings which ultimately involved the entire musculature in typical tetany. Death always occurred between 40 and 60 hours after the drug was administered.

On investigation it was discovered that the dogs at Nashville were fed on a lean meat diet and allowed but little bone. It was found that the simple addition of calcium salts to the meat diet for two weeks before the administration of carbon tetrachloride made the dogs at Nashville show the same tolerance for the drug as those at Baltimore. Furthermore, it was found that if calcium chloride were administered intravenously to dogs in the convulsive or unconscious stages of intoxication they were able to walk round the laboratory in a fairly normal condition 15 to 30 minutes after the injection. But although these dogs were saved and appeared to return to normal health their livers subsequently revealed severe lesions. The oral administration to dogs of carbon tetrachloride in doses of 2 c.cm. per kg., always caused lesions of the liver and kidneys but no demonstrable functional disturbances as estimated by the phenol-tetrachlorphthalein, and phenol-sulphonephthalein tests.[23] The poison caused different lesions in the body according to its route of entry.[24]

I will show that sodium and potassium oxalate given in sufficient dosage not only cause nephritis, but severe necrosis of the liver, the lesions being comparable to those seen in some cases of eclampsia. Dogs in convulsions and dying from these poisons may be saved by the intravenous injection of calcium chloride. I will also show that guanidine carbonate is much more toxic to dogs if their blood calcium be previously lowered by an intravenous injection of sodium oxalate. From this evidence it is clear that calcium defends the body against the toxic effects of bile-pigments, carbon tetrachloride, sodium oxalate, and guanidine carbonate. It is peculiarly interesting to note that dogs can draw on their store of calcium in their bodies to defend themselves against the toxic bile-pigments, but that the mobilisation of the calcium is not rapid enough to defend them against carbon tetrachloride. In both sets of dogs the blood calcium was normal or above normal levels, so that it is evident that estimations of the blood calcium by any known means are valueless in these cases. Calcium in the blood is locked up or bound in many ways. It is only the free or ionised calcium that is of service in defending the body against toxic substances, and

biochemists will render a great service to medicine if they can devise means of measuring such calcium in the blood.

If the liver function be upset by any toxin the proper metabolism of meat is prevented and an increase of guanidine appears in the blood. Guanidine, like insulin, lowers the blood-sugar and is antagonistic to calcium. A vicious circle is thus initiated; the calcium, which is insufficient to deal with intestinal toxins, is opposed by increasing quantities of guanidine which lowers the blood-sugar. The glycogen stores of the body are seriously depleted at the end of pregnancy, and the great demands for sugar on the part of the fœtus must be met from "current" supplies and not from reserves.

The Genesis of Eclampsia.

I will now describe how I believe an attack of eclampsia to be initiated. For reasons I have already stated the pregnant woman absorbs more toxins than normal from the intestinal canal. These toxins should be detoxicated and conjugated in the liver, calcium being the most important chemical in the processes involved. The liver possibly carries on its functions with low reserve powers for several weeks; but the calcium intake is insufficient. The fœtus, a true parasite, demands considerable and increasing supplies of those very substances—calcium, sugar, iodine, and iron—which the mother needs to save herself from impending disaster; and the mother, obeying biological laws, meets the demands. The liver, carrying out metabolic functions for both mother and fœtus and overwhelmed by an excess of toxins, fails, and the stage is set for a catastrophe which may be precipitated by the ingestion of food, by the onset of labour, by some violent emotion, or by a sudden change in the meteorological conditions.

The fits are probably caused by a sudden drop in the level of the blood-sugar associated with a hypocalcæmia, or by hæmorrhages into, or œdema of, the brain. Minot and Cutler[25] state that the blood-sugar is lowered by carbon tetrachloride. It may be raised either by giving calcium or sugar. If sugar alone be given the nervous symptoms persist, but if calcium alone be given the blood-sugar is raised and the nervous symptoms disappear. They[26] state that the blood-sugar is low both in eclampsia and in pre-eclampsia and that in eclampsia the blood guanidine is definitely raised. Mann and Magarth[27] showed in 1921 that removal of the liver in dogs produces a condition which closely resembles eclampsia. It has also been shown that increasing doses of insulin given to dogs on a well-balanced diet cause similar symptoms leading to death, with changes in the liver comparable to those seen in those of patients who die from the toxæmias of pregnancy.[28]

The results of investigation into the blood-sugar levels in eclampsia are conflicting. A few workers report a definite hypoglycæmia, but the majority are unable to obtain results which do not fall within normal limits. The time at which the blood is taken for analysis is of paramount importance. There is evidence[29] to suggest that a sudden fall in the level of the blood-sugar occurs immediately before the fit, and that it may be higher than normal during and immediately after the convulsion. That is to say, a patient suffering from hypoglycæmic convulsions may actually have a higher blood-sugar than a man in possession of normal health. Similarly, a sudden drop in the blood calcium causes tetany, and I am informed that it has occurred with a blood calcium of 14 mg. per cent.[30]

In eclampsia the damaged liver will be unable to elaborate antithrombin, and the unopposed fibrinogen in the blood, already greatly in excess of normal, might cause intravascular clotting as described by Wooldridge and hæmorrhages in the liver, brain, and lungs.

A primipara would be more liable to the condition for the three following reasons: (1) Her abdominal musculature is more taut and causes greater embarrassment to the intestines. (2) The head of the fœtus usually fixes in the pelvic brim four weeks before the onset of labour and increases the tendency to intestinal stasis. (3) She fears labour and her anxieties are usually increased by her friends.

Hydramnios and multiple pregnancy obviously cause increased embarrassment of the intestines, and the latter condition causes an increased drain on the maternal supplies. The association of the disease with certain weather conditions may be explained by the fact that the sudden onset of cold weather demands an immediate rise in the blood-sugar which the woman might not be able to meet. It has been shown by Embden, Lüthje, and Liefmann[31] that metabolic rates are normally increased in cold weather and decreased in warm weather.

There is no known fact about eclampsia that cannot be explained on the hypothesis that it results from increased absorption of toxins and a breakdown in the mechanism which normally defends the body against them. There is no hard-and-fast line, clinical or pathological, to demarcate eclampsia from any other of the toxæmias occurring during the latter months of pregnancy, and the evidence suggests that they are all caused by the same factors, and are different expressions of a damaged liver.

Accidental Hæmorrhage.

Cases of accidental hæmorrhage may be divided into two groups. The larger group consists of those in which the placenta has a lower insertion than normal, but too high to be termed placenta prævia. Such cases are not usually associated with albuminuria. The other group of cases is associated with a true toxæmia. Failure to recognise these distinct groups has caused much confusion and has tended to obscure the ætiology of the toxæmic group.

Browne,[32] as the result of some interesting experiments with rabbits, has suggested that chronic nephritis is a predisposing factor in the causation of this condition. I submit that his conclusions are untenable for the following reasons:—

1. Toxæmic accidental hæmorrhage does not occur in Siam, the Persian Gulf, Iraq, Syria, although chronic nephritis is not uncommon in these countries.
2. A high percentage of cases offer no evidence of chronic nephritis when examined a fortnight after delivery.
3. Of the nine fatal cases whose kidneys I have examined not one showed evidence of a chronic nephritis.
4. I obtained sections of the liver from seven of these nine cases. They all showed areas of necrosis, and in three hæmorrhagic necroses were present.

It seems clear that toxæmic accidental hæmorrhage, like eclampsia, is associated with areas of necrosis in the liver, and its ætiology can be explained in a similar manner.

Experimental Work on the Nature of Eclampsia.†

I will now give a résumé of the experimental work I have done during the last three years at Bangkok. Dogs were used because their metabolism is similar to that of man and they have placentæ which are partly deciduous.

They were kept in suitable cages in the open air under thatched roofs, and were exercised morning and evening. The urine was examined daily for albumin and at frequent intervals for casts and cells. Most domestic animals in Siam are fed on boiled rice with a few boiled vegetables, and this was the diet given to the dogs until they were given the all-meat diet mentioned in the experiments. The meat given was beef muscle and contained but little fat. No bones were allowed. Such a diet contains all the vitamins.

It must be remembered that the duration of pregnancy in dogs is 63 days compared with 265 days in man. It is always difficult to procure pregnant bitches, and such animals when obtained are usually within three weeks of

† The expenses were met from a grant given by the Rockefeller Foundation for the use of the visiting professors at Bangkok, to whom I have pleasure in expressing my gratitude. I also wish to thank my past assistants, Dr. Chamras and Dr. Piam, for looking after the dogs and assisting me with the operations, and my friend, Dr. Wilfred Shaw, for allowing me the hospitality of his laboratory at St. Bartholomew's Hospital since my return to England and for taking the microphotographs.

term. It is thus obvious that errors in diet have much more time to produce their effects in man than they have in dogs.

The experiments fall into four main divisions: 1. The injection of substances intravenously. 2. The operative separation of the placenta, and the injection of substances into the uterine vessels to cause local thrombosis. 3. The causing of an intestinal obstruction, usually by closing the anus. 4. The feeding of pregnant and non-pregnant dogs on a meat and water diet.

Intravenous Injections.

1. *Solution of fæces.*—Fæces from a pregnant bitch were placed in a tin and covered with water in which they were stirred. The tin was allowed to stay in the sun for three days. The fluid was then boiled and filtered. On Dec. 5th, 1927, 10 c.cm. of this solution together with 10 c.cm. of a 2 per cent. solution of sodium oxalate were injected into a vein of a large black bitch near term. Three pups were born within 24 hours of the injection. Two were stillborn and the third died the next day. The bitch had albumin + in her urine for two days, and a trace of albumin for a further six days.

2. *Eclamptic blood.*–On August 20th, 1928, 5 c.cm. of citrated blood from an eclamptic patient were injected intravenously into a small pregnant bitch. Next day 15 c.cm. of blood from the same patient (it had been kept in an ice-chest) were injected intravenously into the same bitch. Some of this blood missed the vein. The day following the bitch had albumin + in her urine. A trace of albumin was found on the 23rd, but none was subsequently discovered. The bitch remained well and was used for further experiments.

On Feb. 11th, 1929, 40 c.cm. of citrated blood from an eclamptic patient were injected intravenously into a pregnant bitch which had been for five days on a meat diet. The injection apparently had no effect on the animal, and albumin never appeared in the urine. She did, however, die on the 14th evening of the meat diet.

It is evident that relatively large doses of eclamptic blood are not very toxic to pregnant bitches.

3. *Potassium and sodium oxalate.*—(*a*) Bitch near term; 45 c.cm. of a 4 per cent. solution of potassium oxalate were injected intravenously in three doses of 10, 15, and 20 c.cm. between Jan. 7th and 10th, 1929. The anus was closed on the 9th and the bitch was put on a meat diet. On Jan. 11th the animal refused food; on the 12th it reeled around as if drunk, and on the 13th it went into convulsions. The back was extended, the eyes remained open, and there was a marked tremor of the limbs. The bitch died after the convulsions had lasted one hour and before the pups were born.

Non-pregnant bitch.—(*b*) 80 c.cm. of a 2 per cent. solution of sodium oxalate were injected intravenously in three doses of 20, 20, and 40 c.cm. between Jan. 16th and 19th, 1929. One hour after the last injection convulsions commenced. The dog crunched its teeth, bit its tongue, and died half an hour later.

A third dog developed convulsions after three doses of sodium oxalate but was saved by two injections of calcium chloride.

The livers of both the dogs who died showed severe degeneration with areas of necrosis. Many of the capillaries and veins were blocked by hyaline thrombi. The kidneys showed a severe parenchymatous degeneration. The convulsions were very similar to those seen in eclampsia, and it is noteworthy that animals with areas of necrosis in the liver and severe parenchymatous degeneration of the kidneys may be saved by the intravenous injection of calcium chloride.

4. *Guanidine carbonate.*—With the object of lowering the blood calcium two dogs—a bitch of 11·5 kg. and a dog of 12·3 kg.—were given three intravenous injections of 10 c.cm. of a 2 per cent. solution of sodium oxalate on June 29th, July 1st, and July 3rd. On July 7th 1·0 g. guanidine carbonate in 5 c.cm. of normal saline was injected intravenously. The symptoms in the two dogs were very similar: (1) The blood pressure rose by 40 mm. Hg within five minutes. The highest reading obtained was 170 mm. (60 mm. above the original reading). (2) A definite weakness of the legs, especially the hind legs, was apparent after a few minutes. (3) The dog stood or sat with half closed eyes and bowed head and sneezed frequently, knocking its head on the floor. I have seen the same symptoms in severe cases of distemper. (4) The dog vomited and passed frequent soft light-coloured stools. (5) Excessive salivation was very pronounced. (6) The pulse became very irregular, with frequent extrasystoles. In one dog a definite coupling of the beats persisted for over an hour. (7) The blood pressure remained elevated for over six hours.

At 10 A.M. on July 8th a bitch of 10 kg., with a blood pressure of 110 mm. Hg, was given 20 c.cm. of a 2 per cent. solution of sodium oxalate intravenously. At 2·30 P.M. 1·0 g. guanidine carbonate in 5 c.cm. of saline was injected intravenously. The symptoms observed were similar to those already described. In this case, however, the dog vomited more frequently and the respiration-rate was amazingly affected. Half an hour after the injection the respiration-rate was 204. Later the following readings were made: 3.15 P.M.: blood pressure, 190; pulse, 126; resp., 188 4.30 P.M.: B.P., 155; pulse, 103; resp., 36. The dog appeared to be quite well five hours after the injection.

Three dogs which had been fed on meat and water for four weeks were then used. On August 5th 1·0 g. guanidine carbonate in 5 c.cm. of saline was injected intravenously into all three dogs and did not appear to have any effect on the animals. It was thought that the drug which had been kept in solution in ampoules might have deteriorated. On the 8th 1·0 g. guanidine carbonate in a freshly prepared solution was injected intravenously into two of the dogs used on August 5th. One dog had mild symptoms with marked coupling of the pulse beats, but became quite normal in three and a half hours. The other dog had mild symptoms, but the blood pressure remained elevated for seven hours.

It is thus evident that the same dose of guanidine is made much more toxic to dogs if the blood calcium be previously lowered by an injection of sodium oxalate. It is possible that the continuous presence of an increased amount of guanidine in the blood might prove to be more serious than the sudden introduction of a large dose of the drug, for guanidine is antagonistic to calcium which obviously protects the body from its toxic effects.

The effect of separating the placenta was tested as follows:—

Separation of the Placenta.

On Dec. 14th, 1927, a bitch was anæsthetised with ether and the abdomen was opened. A small incision was made through the wall of the uterus superficial to a placenta. The placenta was then separated from the uterine wall with the little finger for an inch in all directions. The incision in the uterus was sutured with catgut and the abdomen was closed. The urine remained normal, and the dog took its food well and enjoyed excellent health.

An effort was then made to produce thrombosis in the vessels supplying the placenta by injecting drugs into the uterine vessels.

On Dec. 17th, 1927, I opened the abdomen of a medium-sized bitch and selected a large vein immediately superficial to a placenta. Into this vein 6 c.cm. of a 25 per cent. solution of sodium chloride were injected and the vein was then tied. Albumin + was detected in the urine for three days after the operation.

After this date the use of ether was discontinued and all operations were performed under morphine narcosis, morphine sulphate gr. ¼ being injected half an hour before the operation commenced.

On Feb. 1st the abdomen of a large bitch was opened and 10 c.cm. of a 25 per cent. solution of sodium chloride were injected into the right uterine artery. The urine next day contained albumin + +; and two days later it contained 12·0 g. of albumin per litre. The albumin became less and less and finally disappeared 12 days after the operation. No pups were born.

On Feb. 16th the abdomen of a medium-sized bitch was opened and 10 c.cm. of a 25 per cent. solution of sodium chloride were injected into the right uterine artery. A trace of albumin was detected in the urine only on the day following the operation. On the 24th the wound was opened and two veins immediately superficial to a placenta in the left cornu were selected. Into one of these 10 c.cm. and into the other 8 c.cm. of a 25 per cent. solution of sodium chloride were injected. The veins were then tied. The faintest trace of albumin was detected in the urine on the two days following the operation. On March 8th the wound was reopened and an incision was made in the wall of the uterus in the immediate neighbourhood of the veins into which the injections had been made. The placenta was then separated for about a third of its area of attachment and the incision closed. Some old blood, probably the result of the injections, escaped during this manœuvre. 10 c.cm.

of a 25 per cent. solution of sodium chloride were then injected between the placenta and the uterine wall. On the following day one dead pup was born in an excess of old blood. The urine contained a trace of albumin. Next day the urine contained no albumin. The other pups were not born.

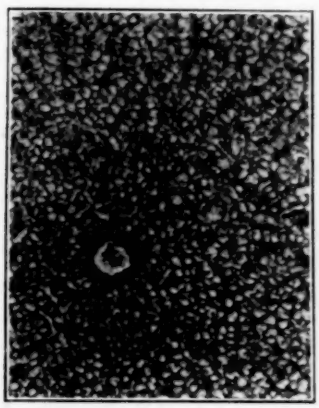
On March 29th the abdomen of a medium-sized bitch was opened and 3 c.cm. of a 25 per cent. solution of sodium salicylate were injected into the right uterine artery. 2 c.cm. of the same solution were injected into the right uterine vein. Both vessels were tied. The urine contained no albumin. On April 3rd the wound burst open and the dog died. The pup in the right cornu was macerated. Many of the vessels in both horns of the uterus were thrombosed and were stiff like pipe-stems. All the placentæ were still attached to the uterine walls.

It is thus evident that neither separation of a small area of the placenta nor thrombosis of vessels in the uterus causes a toxæmia.

FIG. 1.

(Dog 10.) Section showing villi of jejunum which have lost their epithelial covering.

FIG. 2.



(Dog 11.) Section of liver showing fatty degeneration and œdema.

FIG. 3.

(Dog 30.) Section of liver showing fatty degeneration and loss of liver structure.

Intestinal Obstruction.

Several methods were tried to obtain a chronic intestinal obstruction in pregnant bitches. The method adopted was to close the anus in the following manner.

Two purse-string sutures of silk or chromicised catgut were passed through the anal mucous membrane about a quarter of an inch distal from the anus. These ligatures when tied closed the anal canal. The anus was then closed with silkworm gut. These ligatures were covered with adhesive plaster passed under the tail and round the body.

Six dogs were treated in this manner; they were given the ordinary rice diet, to which some meat was added. The sutures tended to cut out after about three days and further sutures had to be introduced.

Dog 1.—Experiment lasted five days. A faint trace of albumin was found in the urine before the dog was killed.

Dog 2.—Bitch was not pregnant. Experiment lasted 11 days. A trace of albumin was found in the urine before the dog was killed.

Dog 3.—Experiment lasted 10 days. Red blood corpuscles, pus cells, and epithelial cells were found in the urine.

Dog 4.—Experiment lasted 12 days. Red blood corpuscles, epithelial cells, and a trace of albumin were found in the urine before the dog was killed.

Dog 8.—Experiment lasted 11 days. On the sixth day the abdomen was opened and two small pieces of liver were excised. The urine towards the end of the experiment contained albumin ++, and the uterus was found at the post-mortem examination to be septic.

Dog 7.—The dog died within 24 hours of the anus being closed. At the post-mortem examination it was found that all the placentæ had been separated before death. As the uterus was incised a lot of old blood escaped. The urine contained albumin and pus cells. The dog was mangy. This was the only case of antepartum separation of the placentæ.

Dog 5.—Medium-sized bitch. The abdomen was opened and the neck of the uterus, including the vessels on either side, together with the rectum were included in two strong chromicised catgut sutures. The dog had convulsions and died 41 hours after the operation.

Dog 6.—A large black bitch, not pregnant. The abdomen was opened and the rectum was occluded as low down as possible with two chromicised catgut ligatures. After six days the dog vomited and was unable to take any food, so it was killed with an injection of sodium cyanide. The urine contained many red blood corpuscles and epithelial cells.

The pathological findings in all these animals were remarkably similar. The kidneys showed a parenchymatous degeneration, especially affecting the convoluted tubules. The *liver* showed marked degenerative changes. The cells with their nuclei stained badly; many showed marked vacuolation. Small areas of necrosis were seen, but had no relation to any part of the lobule. Small collections of leucocytes were occasionally seen. Large numbers of leucocytes surrounded the portal vessels. Areas of hæmorrhage were seen in sections from dogs 2, 4, and 7.

In the intestines small hyperæmic areas were visible in many areas of the small intestine, the jejunum being especially affected. On microscopic examination these areas showed villi without any epithelium. Many of the villi were completely destroyed (Fig. 1).

These experiments produced very grave lesions in the liver and kidneys, but were open to the accusation that the results were due to sepsis rather than to an intestinal stasis.

Feeding Experiments.

Three dogs were then kept in cages and fed on fresh lean meat and water. They all became extremely constipated.

Dog 11.—A large pregnant bitch, and dog 12, a large bitch, not pregnant, were killed on the twelfth day of the experiment. Six pups were born to dog 11 on the seventh day of the experiment one being stillborn. Dog 13, a medium-sized pregnant bitch, died on the fourteenth day of the experiment. It is possible that the blood from an eclamptic patient injected on the sixth day of the experiment had some effect on this animal.

The urine of all the animals contained red blood corpuscles, pus, and epithelial cells before they died. The urine of dog 12 contained a slight trace of albumin. All the *kidneys* showed parenchymatous degeneration, especially affecting the convoluted tubules (Fig. 2). The changes were most marked in dog 13. The *livers* of dogs 11 and 12 contained an excess of fat and showed small areas of cellular necrosis. The liver of dog 13 showed severe degeneration and areas of

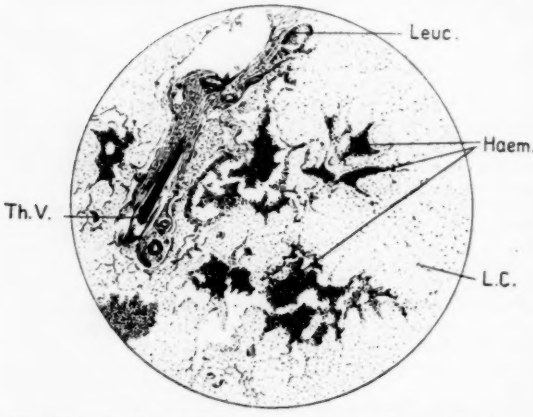
cellular necrosis. Many hyaline thrombi were seen in the sections from all these dogs. Sections taken through the hyperæmic patches scattered through the small *intestines* and particularly in the jejunum, showed villi without their epithelial covering and in all stages of degeneration.

Two large bitches which had been frequently served between Feb. 10th and 15th, 1929, were placed in cages on Feb. 15th. They were both killed after they had been on a meat and water diet for 33 days.

Dog 30 was thought to be pregnant, for the abdomen became definitely enlarged. After about four weeks the abdomen became smaller, and towards the end of the experiment the dog became weak and ill although it was taking about one and a half pounds of meat daily. The dog was killed with ether on March 19th. The colon was very distended for its entire length with enormously hard black fæces. The small intestines were practically empty. There were small hyperæmic patches in the intestines, especially in the jejunum. The *uterus* was enlarged and showed definite signs of a recent pregnancy. There were five distinct placental sites and a lot of sticky fluid in both horns. No pups were born. They must have died and been partly absorbed and partly discharged per vaginam. The urine remained normal. On microscopical examination of the *liver* the whole section stained badly. One portion of the section shows extreme fatty degeneration, looking like omentum. There are areas of cellular necrosis with loss of liver structure (Fig. 3). One large vein and many smaller vessels are occluded by hyaline thrombi. The *kidneys* showed parenchymatous degeneration especially affecting the convoluted tubules.

Dog 31 was never thought to be pregnant. On the 19th it was killed with chloroform. The post-mortem findings were similar to those seen in dog 30. The urine contained a trace of albumin and a few hyaline casts. The *uterus* was enlarged. Two placental sites were seen in the left cornu and one in the right. In the tip of the right cornu was a small fœtus, the placenta of which was partly detached. There was some old blood in the sac and behind

FIG. 4.



(Dog 35.) Section of liver. The liver cells are merely indicated in order to show up the hæmorrhage in the periphery of a lobule. Hæm. = areas of hæmorrhage. L.C. = liver cells. Th.V. = thrombosis of vein. Leuc. = collection of leucocytes.

the partially detached placenta. On microscopical examination of the *liver* the cells appeared to have undergone a granular degeneration, but there seemed to be no great excess of fat in the sections. There was a fair amount of congestion with early hæmorrhages in one or two areas, and there were small areas of cellular necrosis.

One dog and two non-pregnant bitches (32–34) were confined in cages and placed on the meat diet. They were killed at the end of four weeks. The findings were similar to those of dogs 30 and 31. The kidneys showed parenchymatous degeneration. The liver showed marked fatty degeneration with many areas of cellular necrosis scattered through the sections, and affecting all portions of the lobules.

Dog 35 was a medium-sized bitch, not pregnant; the experiment began on March 12th and she was killed on April 16th (34 days). For the first 23 days 1 lb. of meat was given daily. From that date until the end of the experiment, with the exception of two days when nothing but lung was given, 2½ to 3 lb. of meat were allowed. For the last three days lung was given with the meat. The animal became very constipated, going for three to four days without passing fæces. On three days in the week immediately preceding its death it passed large amounts of soft, light-coloured fæces (almost diarrhœa), and then again became constipated. The urine remained normal except for an occasional trace of albumin. No casts were found. The dog was killed by an intracardiac injection of potassium cyanide. The colon was found to be comfortably filled with dark, hard fæces. The small intestines were nearly empty. The liver was congested and showed areas of subcapsular hæmorrhage. The kidneys appeared to be fairly normal. The capsules were adherent in one or two places.

FIG. 5.

(Dog 32.) Section of kidney showing parenchymatous degeneration especially affecting convoluted tubules.

On microscopical examination of the *liver* the whole section shows marked degenerative changes. There are areas of cellular necrosis scattered through the sections and many areas showing hæmorrhage in the periphery of the lobules (Fig. 4). There are also a considerable number of areas showing collections of leucocytes, usually in association with necrotic liver cells. Many of the capillaries and veins show thrombosis. The *kidneys* show a moderate degree of parenchymatous degeneration. The glomeruli appear to contain an excess of endothelial cells.

I am not yet in a position to say whether the hæmorrhages in the liver of dog 35 were caused merely by giving two to three times the amount of meat allowed to the other dogs or whether the lung (containing as it does a rich supply of fibrinogen) added to the diet had this effect. I am disposed for the present to believe that the important factor was the increase in the amount of meat.

It is thus clear that simply by feeding dogs on a lean meat diet, we can produce a parenchymatous degeneration of the kidneys and severe degeneration of the liver with the following changes: (1) recent and hyaline thrombi in the veins and capillaries; (2) collections of leucocytes in the lobules; (3) fatty and other types of degeneration; (4) areas showing cellular necrosis; (5) areas of hæmorrhage in the periphery of the lobules. Any poison may affect any or all portions of the lobule depending on its concentration in the blood and route of entry. In the toxæmias of pregnancy, eclampsia included, the centre and middle portions of the lobule are more often affected than the periphery, although the areas of hæmorrhagic necrosis, when present, are more frequently encountered in the periphery of the lobule.

It will be observed that I have not been able to procure a pregnant bitch for experiment earlier than 14 days before its confinement.

Conclusions from the Experiments.

(1) Eclamptic blood is not markedly toxic to pregnant bitches.

(2) Sodium and potassium oxalate cause dogs to die with convulsions. These drugs cause severe degeneration of the liver and kidneys, but the animals may nevertheless be saved by the intravenous administration of calcium.

(3) Guanidine carbonate causes a rapid and prolonged rise in the systolic blood pressure in dogs. It has a very much more toxic effect if the blood calcium be previously lowered.

(4) Separation of a portion of the placenta causes no toxæmic symptoms in pregnant bitches.

(5) If intestinal stasis be caused by closing the anus the liver and kidneys become severely damaged. These changes occur whether the animal be pregnant or not, but are more marked and occur more quickly if the bitch be pregnant.

(6) A lean meat diet given to dogs for about 30 days causes the following effects: (*a*) A marked constipation associated in every case with patches of hyperæmia in the small intestine, particularly the jejunum, which on microscopical examination show the villi to be denuded of their epithelial covering and undergoing degeneration. (*b*) A parenchymatous degeneration of the kidneys, especially affecting the convoluted tubules (Fig. 5). (*c*) Severe degeneration of the liver, with cellular necrosis and peripheral hæmorrhage.

(7) A lean meat diet if given to bitches early in pregnancy causes death of the fœtuses.

(8) A parenchymatous degeneration of the kidneys is not necessarily associated with albuminuria. A marked albuminuria did not occur in any of these dogs.

(9) The damage to the kidneys is slight compared with the severe damage to the liver.

SUMMARY.

1. Eclampsia is neither caused by a placental toxin, nor by any functional or organic lesions in the kidneys.

2. The defensive forces of the body are compromised by pregnancy in several ways: (*a*) the liver has to undertake duties both for the mother and the fœtus; (*b*) anxieties associated with pregnancy and the bulk of the uterus may prevent the proper digestion and assimilation of food; (*c*) the fœtus requires considerable quantities of sugar, about 8·0 g. of calcium and corresponding amounts of other important substances during the last four weeks of pregnancy.

3. Deficiencies in the diet are exposed by pregnancy.

4. Intestinal stasis, aggravated by the bulk of the uterus and by the fixing of the fœtal head in the pelvis, causes an increased absorption of toxins.

5. A lean meat diet causes severe changes in the livers and kidneys of dogs. This diet contains all the vitamins but very little calcium.

6. This diet causes death of the fœtus if given to bitches sufficiently early in pregnancy, and it is probable that human abortions, for the majority of which no adequate explanation can be offered, may be caused by deficiencies in the diet.

I submit that one is, therefore, justified in deducing from the known facts about eclampsia, together with the results of the experiments recorded, that the disease is caused by toxins absorbed from the intestinal canal, which, owing to a breakdown in the defences of the body, are not detoxicated. The success of the various expectant methods of treatment, which are all based on that in use in the Rotunda Hospital and first described by Tweedy in 1896, as well as the brilliant results obtained by antenatal care, testify to the truth of this.

I have attempted to elaborate my thesis by suggesting that a deficiency of ionised calcium in the blood is the cause of the breakdown of the defences of the body. Whether this suggestion be true or not in no way vitiates the truth of the main hypothesis.

The following are the main points of the elaboration:

(1) It is probable that calcium is the chemical most closely concerned in protecting the body from toxins, and that it can only exercise such functions when in an ionised form.

(2) The available maternal supply of calcium may be deficient for the following reasons: (*a*) deficient intake; (*b*) deficient absorption; (*c*) increased elimination associated with an acid urine; (*d*) a certain amount is used for making colostrum; (*e*) the fœtus requires heavy supplies; (*f*) vitamin D is required for its proper use and may be deficient.

(3) A damaged liver cannot properly metabolise meat so that the amount of guanidine in the blood is increased. Guanidine is antagonistic to calcium and lowers the blood-sugar.

(4) A damaged liver is associated with a deranged metabolism which may express itself in a variety of ways. Its failure to produce antithrombin would allow the excess of fibrinogen in the blood to cause hæmorrhages in various parts of the body.

(5) The fits may be caused by: (*a*) a sudden drop in the blood-sugar associated with a hypocalcæmia; (*b*) by œdema of, or hæmorrhages into the brain; (*c*) by the toxins acting directly on the central nervous system.

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A FATAL NEURO-PARALYTIC ACCIDENT OF ANTIRABIES TREATMENT.

BY G. STUART, O.B.E., M.D. ABERD., D.P.H.,

AND

K. S. KRIKORIAN, M.D. BEIRUT.

(*From the Central Laboratories, Department of Health, Government of Palestine.*)

THIS paper is written primarily to record a fatal case of acute ascending (Landry's) paralysis which recently followed on treatment at the Central Anti-Rabies Institute, Jerusalem.

The patient was an unmarried agricultural labourer, aged 24 years, a Jew of Russian extraction, resident in Palestine eight years. The family history contained no affections of the nervous system and no evidence of mental disease, paralysis, or fits. There was nothing in the patient's occupation, mode of life, or environment likely to injure health or predispose to nervous instability. He had had benign tertian malaria for several months during 1928, but otherwise no acute illness or infectious disease. There was no abnormality in the circulatory system and no chronic renal disease.

On Dec. 27th, 1929, he was bitten in a rural district by a stray dog which had escaped after having, unprovoked, inflicted a single wound of moderate severity on the upper extremity through the clothing. The wound was not cauterised; there is no record of other persons or animals bitten at the same time. On Jan. 1st, 1930, antirabies treatment was begun at his request, and continued until Jan. 14th, when a full course of injections had been administered. During his period of attendance his conduct was exemplary; no local accidents or accidents with a local

point of departure occurred, and he showed no signs of nervousness and remained well throughout.

On Jan. 14th, in the afternoon, some six hours after receiving the last injection, while shaking hands with a friend, he experienced a feeling of weakness in the right arm; towards evening he was compelled to lie down on account of numbness in the legs. On Jan. 15th he could not pass urine or lift his arms, and was admitted to hospital.

He was strong and athletic looking; his temperature was 98° F., his pulse-rate 90–96, and the pulse regular but somewhat weak. His respiration-rate was 26. His tongue was coated but his tonsils and pharynx were normal. The pupils reacted promptly to light and to accommodation, and his mind was perfectly clear. He complained of nausea and of a slight pain between the shoulder-blades. There was total flaccid motor paralysis of both inferior extremities; limited movement of the arms was still possible. The patellar tendon reflex and abdominal reflex were abolished, but Babinski's sign was not elicited. There were no sensory disturbances in the extremities, and the tactile pain and temperature senses were unaffected. The heart and lungs were normal, there was no enlargement of the abdomen, no pain on pressure, and the spleen and liver were not palpable. The urinary bladder was distended, reaching to within 8 cm. of the umbilicus. There was retention of fæces and urine, necessitating the use of a catheter. The urine was free from albumin, sugar, bile-pigments, and other pathological constituents. After catheterisation the patient was given 0·05 g. luminal (phenobarbital). He slept badly, suffering from nausea and vomiting, and was only able to retain a little tea. On Jan. 16th his temperature was normal but his pulse very frequent and irregular, and he had complete motor paralysis of both arms.

After injections of strychnine, lobeline, and hexetone (a camphor preparation: methyl-isopropylcyclohexenon in solution with sodium salicylate) improvement in his general condition was noted; the pulse became more satisfactory and the nausea disappeared. Constipation was relieved by an enema. During the night direct transfusion was performed, 700 c.cm. of blood being taken from a donor who had lately received identical antirabies treatment; a slight feeling of chill but no temperature followed the operation.

During the forenoon of Jan. 17th the patient felt better, took nourishment with considerable appetite, and passed urine freely; the motor paralysis of both extremities remained unchanged. His temperature was 98·6° F. and his pulse 90, strong and regular. Late in the afternoon he complained of heaviness and pressure, feeling as if a large stone were resting on his chest. At 10 P.M. salivation became markedly increased, and he frothed at the mouth without cessation. He was fully conscious and complained of difficulty in breathing. At 4 A.M. on Jan. 18th respiration ceased, the pulse continuing to beat for a few seconds more.

This summary of the clinical course and therapeutic measures has been prepared largely from notes supplied by Dr. Ben-Shabetai, physician to the Shaare Zadek (Jewish) Hospital, Jerusalem.

A pathological condition presenting as its main features a rapidly advancing (flaccid) paralysis, without fever, without sensory changes, without loss of sphincter control, and terminating fatally within a short time from involvement of the bulb, is characteristic of a paralysis of the Landry type.

The vaccine employed was a 2 per cent. emulsion of fixed virus brain killed by the combined action over 24 hours of heat at 37° C., and of 1 per cent. phenol, and diluted to half with physiological saline solution prior to use. Treatment consisted of the daily administration, over 14 consecutive days, of 5 c.cm. of killed carbolised virus, and the paralysis, which occurred six hours after the fourteenth injection, followed on the introduction of 0·7 g. of nerve substance.

"The doctor should, above all, bear in mind the old adage, *primo non nocere*, and, as Roux was the first to advise, will avoid any active or progressive medication and will let the disease follow its natural course." (Remlinger, 1927.)

From this standard there was, in the present instance, obvious departure. The blood transfusion, surely without precedent in the treatment of such accidents, was carried out as a result of deliberation among the consulting staff of the hospital. Their recommendation appears to have been based on a belief that the condition was due to a lack of antibody to nervous substance in the patient's tissues; this want, it was argued, might be supplied by blood transfusion from a treated person who, remaining unaffected by the injections, presumably possessed such antibody. After two preliminary failures to find a suitable donor—both sera hæmolysed the patient's red cells—success was achieved in the person of a young volunteer who had completed antirabies treatment on Jan. 4th. According to Babes (1912), the serum of animals and of persons immunised against rabies may develop hæmolytic properties; the hæmolysis resulting from the admixture of the patient's corpuscles and the two original sera investigated might thus be explained.

Notes on Neuro-Paralytic Accidents in General.

(*a*) *Varieties.*—The clinical forms of paralysis encountered during and following antirabies treatment, and inseparably linked with its administration, present great diversity. Classification based on their degree of intensity, however, gives three main types: neuritic forms or simple localised paralyses from involvement of peripheral nerves (35 per cent.); dorso-lumbar myelitis (30 per cent.), and paralysis of the Landry type (35 per cent.). The percentages are those given by Avezzu (1923). They occur normally within 35 days of commencement of treatment. The greatest incidence falls within the first three weeks, and the earliest date of onset recorded is the fifth day (Brault, 1897). There is no connexion between the date of the bite and the appearance of symptoms. The most serious cases occur during the second week of treatment; in the milder forms the onset is commonly delayed to the end of treatment, or after. The mortality-rate in Landry's paralysis is 30 per cent., in dorso-lumbar myelitis 5 per cent., in neuritic forms nil.

(*b*) *Pathology.*—Those parts of the cord affected show obvious softening, and the distribution of lesions through white and grey matter alike renders differentiation between these components impossible, the whole cord surface presenting a homogeneous greyish-pink appearance. Microscopically the characteristic lesion is a perivascular demyelination, indistinguishable from that of a subacute disseminated sclerosis.

"The vessels are surrounded by a broad embryonic zone, around and attached to which is a network, formed in large part by a proliferation of neuroglia and connective tissue cells." (Babes and Mironesco, 1908.)

The complete histology has been described by Perdrau (1928).

(*c*) *Incidence.*—The frequency of occurrence per 1000 persons treated is variously estimated: thus, according to Babes it is 1·3, to Pelser 0·77, to Simon 0·48, to Remlinger 0·37, to the findings of the 1927 Rabies Conference 0·28. This disparity is to be accounted for by the "inexactitude of the present statistical bases" (Lubinski and Prausnitz, 1926). The figures prove, however, that the condition is relatively rare, and the degree to which it complicates treatment with killed carbolised virus may be gauged from the fact that up to the present there are on record only seven cases, as follows: at Lemberg, one accident among 2213 patients treated—an incidence-rate of 0·218 per 1000; at Jerusalem two among 5409, or 0·37 per 1000; at Kasauli two among 7296 Europeans and one among 77,548 Indians, or 0·27 and 0·013 respectively per 1000 treated persons. The seventh case is from Aquila, one of the dispensaries supplied by Puntoni, and has been described in detail by Alessandrini (1928). Post-treatment paralysis is almost unknown among children and elderly patients and males and females are almost equally liable. Susceptibility is more marked among Europeans than among the natives of tropical countries, and educated people are more readily attacked than those engaged in manual labour. Cases occur, cæteris paribus, at any time during the year without apparent reference to month or climatic condition. While the occurrence of paralysis is unaffected by the nature of the biting animal, the method of treatment and individual predisposition undoubtedly play predominant parts in causation.

(*d*) *Ætiology.*—During the period 1925–28 we made investigation into the ætiological factors responsible for the production of post-treatment

paralysis. The results of animal experimentation strengthened the evidence gained from a study of the condition in human beings. The principal findings of the inquiry, published elsewhere (1928), may be summarised as follows :—

From Results of Experiments on Rabbits and White Rats.

1. Though nervous substance may induce anaphylactic shock, paralytic symptoms are not anaphylactic phenomena.
2. Fixed virus and rabies "toxin" are not concerned in the production of paralyses.
3. Accidents follow the exhibition of brain substance, whether normal or rabid.
4. Homologous and heterologous nerve substance alike induce the condition.
5. The *causa causans* is to be found in the protective inoculations themselves, presumably in some constituent of normal nerve substance unavoidably introduced during immunisation.
6. The deleterious, paralysis-provoking substance present in normal (and equally in rabid) nerve tissue can definitely be rendered innocuous to rabbits and rats by appropriate treatment with 1 per cent. phenol.
7. There appears to exist, within limits, no relationship between the occurrence of accident and the total mass of nerve substance injected. The actual quantity of nerve substance introduced, therefore, is not per se a determining factor; further, absence of such relationship argues strongly in favour of individual hypersensitiveness to the inocula being a principal cause.

The cause, therefore, lies in some constituent of brain substance which is rendered innocuous by the action of phenol. The actual occurrence of accident is governed by predisposition or idiosyncrasy.

From an Examination of the Several Theories of Causation.

1. An explanation of the occurrence of post-treatment paralysis does not need to be sought in subjective phenomena, psychic or hysterical, in street virus rabies attenuated by treatment, street virus, fixed virus, rabies "toxin," enzyme or ferment action, anaphylaxis, accidental bacterial infection, neurotropic virus, or the *genius epidemicus* of Kraus.
2. The cause of paralytic accident lies in the antirabies injections themselves, and more specifically in some component of nerve substance necessarily introduced during the process of immunisation, perhaps in a cytotoxin.
3. Incidence has been reduced to a negligible percentage at institutes where use is made of fixed virus and its—for practical purposes—inseparable vehicle, nerve substance, which has been reduced in concentration or exposed to certain chemical or physical agents. Thus, safety can be achieved by the administration either of emulsions of unaltered nerve substance in high dilution or of emulsions of nerve substance previously subjected to the action of phenol, ether, glycerin, phenol + heat or desiccation—all of which modifications of the original Pasteurian method permit the exhibition of relatively large dosage of vaccine.
4. While the occurrence of paralytic accidents is determined not by the quantity but by the quality of the nerve substance introduced, the vital importance of individual predisposition must be recognised.

Conclusions.

Paralytic accidents can be produced experimentally in a small percentage of cases by the repeated inoculation of nerve substance, whether normal or rabid, homologous or heterologous. In rabbits and white rats it can be prevented by exposure of brain suspensions to the combined action of phenol (1 per cent.) and heat (37° C.) over 24 hours. Apparently in the basic nerve substance of all antirabies vaccines there exists some deleterious component which, although adversely affected by several physical and chemical agencies, is still capable in peculiarly susceptible human beings of exciting symptoms of those nervous disorders classified as the paralytic accidents of anti-rabies treatment. It is as yet impossible to say whether the whole or only part of the nerve substance is to be incriminated. To ascribe causation to fat, lipoid, or a similar component, ether-destructible or ether-soluble, is untenable, as cases of paralysis have followed treatment by Alivisatos's (ether) method. Again, while it is the belief of the majority that a solution will ultimately be found in the action of the protein constituent, actual proof is still wanting, for, no matter what modifications of Pasteurian treatment have been employed, no matter to what degree protein must by such means have been altered or denatured, accidents have surely, if rarely, supervened. Although, therefore, the nerve substance of the inoculations is without doubt primarily responsible, its paralysis-provoking toxic constituent has not yet been determined with certainty. Actual occurrence, however, is governed by individual idiosyncrasy—i.e., relative intolerance to foreign inocula.

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Clinical and Laboratory Notes.

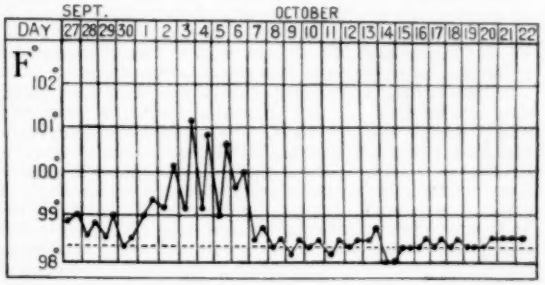
A CASE OF CONCURRENT HERPES ZOSTER AND VARICELLA.

BY JOHN N. CUMINGS, M.B., M.R.C.P. LOND.,
LATE HOUSE PHYSICIAN TO KING'S COLLEGE HOSPITAL.

A GIRL, aged 19, was admitted to hospital on August 28th, 1929, suffering from a badly lacerated right arm.

On Oct. 1st her temperature began to rise (see chart). On the 2nd it was 100·2° F. at 6 P.M., but there was no apparent cause. On the morning of the 3rd she complained of stiffness and neuralgic pains on the right side of her neck, together with some earache. By the afternoon of that day a slightly swollen and reddened area about 1½ in. × 1 in. was present on the lower jaw on the right side, just anterior to the angle. There was a single enlarged and tender right submaxillary gland. That evening the temperature was 101·2° F. with a pulse-rate of 96.

On the 4th pain was still present, although diminished in intensity; the submaxillary gland was less tender, and



there were a few palpable cervical glands on the right side. Over the reddened area, which had been noticed on the 3rd, could now be seen a number of typical vesicles of herpes zoster. There were also a few on the helix of her right ear and one or two on the scalp just above the ear. There was a stinging sensation over the affected area. A number of small vesicles were found scattered on the trunk, particularly on the right side, over the shoulder, the back, and the abdomen. These all resembled the vesicles of varicella, although they were a little smaller than usual. There was no stinging sensation over the trunk but itching around the area of each vesicle was present.

On each of the three succeeding days a fresh crop of vesicles appeared on the body. On the first of these three days a few more appeared on the back and the abdomen; on the second day a smaller number on the upper part of the neck and lower part of the scalp, and a few on the legs; whilst on the third day one appeared on the right ring finger. All these were smaller than usual, resembling in size those that were present on the 4th. They were more

numerous on the right side of the body than on the left side, although both sides were affected. The vesicles became pustular, finally forming scabs and healing. On the 14th the lesions on the face were completely healed, but the spots on the body did not disappear until the 21st.

The temperature chart shows the accompanying general disturbance.

It is of interest to note that another patient in a bed on the opposite side of the ward, admitted on Sept. 9th, developed on Sept. 25th herpes over the area supplied by the left seventh thoracic nerve. She was discharged on Sept. 29th. Whether this has any connexion with the case recorded it is extremely difficult to say, for as far as is known these two patients never came near each other or had anything in common, but there are records of varicella infection from contact with herpes zoster.

I have to thank Dr. C. F. T. East and Mr. Harold Edwards for their permission to publish this case.

A NOTE ON
CHANGES IN THE BLOOD-PLATELETS AFTER OPERATIONS AND INJURIES.

By B. Willinsky, M.D. Toronto.

(From University College Hospital Medical School.)

Dawbarn Earlam and Howel Evans[1] showed that surgical operations of any but the most trivial kind are generally followed by an increase in the number of platelets in the circulating blood; the same thing happens in most cases of normal childbirth and is very marked after Cæsarean section. They showed also that the rise in the platelet count is associated with a diminution in the clotting time of the blood and they suggest that it has a good deal to do with the occurrence of post-operative thrombosis. The platelets usually reach their maximum at about the tenth day, the time at which thrombosis is most likely to occur. There is no change in the count after anæsthesia, simple hæmorrhage, or stopping in bed, and the common feature which excites the reaction seems to be tissue injury. Their observations seemed so important in relation to the troublesome question of post-operative thrombosis and embolism as to be worth confirmation, and with the kind help of Prof. C. C. Choyce and Mr. Julian Taylor I have examined a number of cases from this point of view.

After trying a number of methods I came to the conclusion that Howel Evans's technique was the most reliable and practical. Using paraffined surfaces the blood is diluted with 2 per cent. sodium citrate in 0·29 per cent. sodium chloride stained with cresyl blue, and the ratio between platelets and number of cells determined in a hæmocytometer chamber. It is necessary to use the utmost care to have everything clean and free from particles, and the blood must not be diluted too much or contact hæmolysis[2] may occur. The normal range is, by my counts, from about 200,000 to 600,000 with an average of rather less than 400,000 per c.mm. in the adult male and around 350,000 in the adult female.

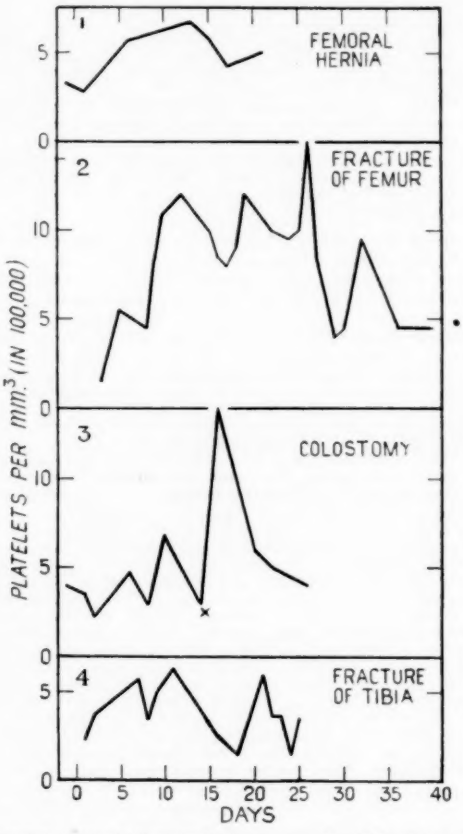
In the majority of cases a rise of some degree occurred. Fig. 1 shows a response to the radical cure of a femoral hernia. An extensive comminuted fracture of the femur, without an external wound or any operative interference, gave the interesting result shown in Fig. 2, in which case there is no obvious cause for the platelet increase except tissue injury. In Fig. 3 a moderate rise followed the first stage of a colostomy and the trivial disturbance of opening the bowel led to a count of more than one and a quarter millions. Fig. 4 illustrates the unexplained ups and downs which may be found (fractured tibia).

[1] Earlam, D., and Evans, H.: Jour. Path. and Bact., 1928, xxxi., 833.

[2] Price-Jones, C.: Ibid., 1924, xxvii., 111.

Additional examples of the post-operative increase are:—

Salpingectomy: 470,000 to 720,000 on third day.
Inguinal hernia: 315,000 to 600,000 on fifth day.
Colostomy: (1) 500,000 to 1 million on second day; (2) 440,000 to 1 million on second day.
Prostatectomy, first stage: 250,000 to 650,000 on sixth day.
Adenoma of breast: 290,000 to 510,000 on sixth day.
Carcinoma of breast: 215,000 to 640,000 on thirteenth day.
Hæmorrhoidectomy: 350,000 to 890,000 on seventh day.
Fractured humerus: 180,000 to 600,000 on thirteenth day.
Compound fracture of tibia and fibula: 290,000 to 850,000 on eleventh day.
Compound fracture of femur: 375,000 to 620,000 on fourteenth day.



Platelet counts in four typical cases mentioned in the text.

A fractured femur, an adenoma of the breast, a gastro-enterostomy, an umbilical hernia, a prostatectomy (second stage), and an injection for varicose veins showed no change. In five instances there was a fall; their preoperative level was high:—

Femoral hernia: 590,000 to 160,000 on eighth day, to 370,000 on tenth day.
Prostatectomy (second stage): 470,000; gradual fall to 310,000 on twenty-fourth day.
Ischio-rectal abscess: 550,000 to 220,000 on eleventh day.
Gastro-enterostomy: 510,000 to 180,000 on fourth day, to 520,000 on sixteenth day.
Appendectomy: 450,000 to 110,000 on fifth day, to 565,000 on thirteenth day.

Several cases showed a slight fall on the first day after operation which does not seem to have been previously noticed. The bone cases showed a rise after manipulation and, taken together, entirely support the view that the increase of platelets is caused by tissue injury, presumably by the absorption of the products of autolysis into the circulation.

No post-operative thrombosis occurred in any of these cases.

For observation of amœboid movement of platelets all vessels and slides must be carefully cleaned. Acids must be avoided in cleaning glassware, which should be washed in distilled water for many hours and dried with pure filter paper before use. There must be no trace of acid or alkali on coverslip or slides, or the counts will be inaccurate. The diluting fluid must not come into contact with rubber or cork, and in mixing the diluted blood bubbles must be avoided or the counts will be valueless. It seems probable that the destruction of platelets is chiefly due to loss of carbon dioxide with alkalinity in the reaction of the blood. Change in reaction of blood is sufficient alone to produce destruction. The diluted blood may remain in the wax cup for half an hour without any noticeable change in the platelet count, but disintegration of platelets follows rapidly when they are allowed to come into contact with water-wettable surfaces. Therefore, the counting should be started within ten minutes after the diluted blood is introduced into the hæmocytometer. If reasonable care is used the counting of blood-platelets is no more difficult than an ordinary red blood-cell count, and the universal adoption of platelet counting will undoubtedly help to solve many of the hitherto unexplainable changes in the blood following operations and injuries.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF OBSTETRICS AND GYNÆCOLOGY.

A MEETING of this Section was held on May 16th, with Dr. A. E. GILES in the chair.

Causation of the Toxæmias of Pregnancy.

Dr. G. W. THEOBALD read parts of the communication which we publish on p. 1115.

Mr. L. C. RIVETT did not think he had ever listened to a more interesting paper. The thesis advanced in it was very important, and every investigation possible should be made to test it.

Mr. EARDLEY HOLLAND said he had been for some time interested in the work of Minot on hyperglycæmia and calcium deficiency in the toxæmias of pregnancy. For a year, at London Hospital, cases of eclampsia and "acute yellow atrophy" had received glucose and calcium intravenously. Though he had not been much impressed by the results in pure eclampsia there had been two remarkable successes in bringing back to life two patients with acute yellow atrophy who were almost moribund. For twenty years the same theory had been accepted by the profession, but he had long felt that a suitable diet was one of the most important factors in the prophylaxis against these toxæmias.

The PRESIDENT also congratulated Dr. Theobald and expressed his appreciation of the thought and labour put into his research. The absence of real discussion he attributed to the need for a quiet assimilation of the contentions advanced.

Results of Hysteropexy.

Dr. MACDONALD reported that as a result of recent comments on hysteropexy figures he had looked up the records from 1920–29 inclusive. These were under three headings: (*a*) hysteropexy done alone for retroversion; (*b*) hysteropexy for polypus; (*c*) the operation performed incidentally for other purposes. 269 hysteropexies for retroversion were followed by no deaths. Under (*b*) there were 426 cases, with seven deaths; under (*c*) 236, with two deaths. In the course of 20 years there were 565 cases of hysteropexy alone with no reported deaths. Four of the seven deaths under (*b*) were due to pulmonary embolism, two to heart failure, and both were over 60 years of age. The other death was from ileus. Under (*c*) one death was from pulmonary embolism, the other from acute phthisis.

The PRESIDENT said his own figures in the same connexion were: hysteropexy for retroversion, four deaths in his first 214 cases; in his last 629 cases, no deaths; in hysteropexy for prolapse, 342 cases, no deaths; for procidentia, two deaths in his first 89 cases; and in the last 45 cases two deaths. Altogether there were 1443 cases, and the last death was in April, 1920, the patient being a woman aged 73.

Mr. T. G. STEVENS expressed his admiration of the figures which had been quoted, but contended that the story at cottage hospitals would be a different one. Hysteropexy was a cottage hospital operation, rather than colporrhaphy.

A Case of Endometrioma.

Dr. F. J. HECTOR described the case of an unmarried woman, aged 26, who was admitted into hospital for the first time in September, 1921, her complaint being of severe dysmenorrhœa.

There was a fixed retroversion and a slightly enlarged uterus. On laparotomy the uterus was found to be held down by dense adhesions, and the left tube and ovary were adherent to the pelvic floor. The adhesions were separated, and the left tube and ovary were removed. There were numerous follicular and retention cysts, and in the tube were chronic inflammatory changes. Nine months later there was a persistence of dysmenorrhœa, with considerable pain in the left iliac fossa, accompanied by vomiting and a feeling of incapacity. A second abdominal section was therefore carried out, and numerous masses were found, resembling fibroids. Subtotal hysterectomy was performed. There was a very hard mass at the base of the left broad ligament, involving a portion of the left ureter, which was kinked and was found to have been occluded. Resection followed, and an end-to-end anastomosis was done. The uterus contained a soft interstitial fibroid, and the endometrium was thickened and showed some polypoid growths. The report was "benign adenomatous polypus of the endometrium." The patient was free from symptoms for four years. Then in 1926 she had an offensive brown vaginal discharge, which became bright red at monthly intervals. An almond-sized polypus was removed, which seemed to be undergoing cystic degeneration. Eighteen months later the discharge recurred, and three friable polypi were removed. They consisted of endometrial tissue embedded in a fine stroma, with some muscular tissue. Three applications of radium were given. Bleeding was now less, and the indurated plaque was smaller.

If radium treatment could be carried out for endometrioma it would be all to the good, said Dr. Hector, for it would save embarking upon a mutilating operation which, in a young woman, was a serious matter.

Dr. J. P. HEDLEY agreed that it might be difficult to deal effectively with an endometrioma, but in using radium one had to consider the secondary effect on the ovaries of a young woman. Hence the policy of applying radium so as to avoid a serious operation was a questionable one. With a woman near the menopause the application of radium might be preferable to a dangerous operation.

Dr. JAMES WYATT asked whether in this case the radium had a direct action on the growth in the vagina.—Dr. HECTOR replied that at present little was known of the effect of radium on the growth. No change was observed in this growth after radium was applied, but the plaque was reduced.

NORTH OF ENGLAND OBSTETRICAL AND GYNÆCOLOGICAL SOCIETY.

AT a meeting of this Society recently held at Liverpool, with Dr. J. W. BURNS, the President, in the chair, Dr. H. H. GLEAVE (Liverpool) read a note on

Endometrial Autotransplants in the Rabbit.

He quoted the results of observations on 45 rabbits in which shavings of endometrium were tied into

an incision in the liver. These developed into enormous cysts, which, however, reached a maximum of growth in two months and were no bigger a year later. The papilliferous condition of the uterus seen in rabbits in pregnancy or pseudo-pregnancy was exactly reduplicated, he said, in the endometrium of the cyst from the influence of the corpus luteum hormone. Similarly, during œstrus the rabbit showed cysts with thickened endometrium like the blunt folds of the uterus. After oöphorectomy both uterus and cyst atrophied, but the injection of 25 rat units of œstrin daily for a week restored the endometrium to the œstral type. Injections of pulped endometrium into the ear vein gave negative results. Vascularity of the site of implantation favoured the taking-root of the implant, and he considered the muscle of the implantation cyst arose from the graft itself and not by metaplasia of the local tissue. These experiments, he considered, offered support to Sampson's theory of the origin of endometriomata.

Dr. J. W. A. HUNTER (Manchester) considered there were two main factors in the growth of human endometrioma—namely, implantation and devitalisation at the site of implant.

Prof. W. BLAIR BELL disagreed that the papilliferous condition of the rabbit endometrium was always due to pseudo-pregnancy, and said it could occur as a result of long-continued œstrus.

Prof. J. H. DIBLE (Liverpool) thought the experiments mainly demonstrated that the endometrium of the cysts and uterus was in the same condition at any one time.

Prof. D. DOUGAL (Manchester) described a case of endometrioma of the abdominal wall occurring in a married nullipara aged 44 years.—Prof. BLAIR BELL reported a case of acute puerperal inversion of the uterus, and Dr. M. M. DATNOW showed a specimen of primary ovarian pregnancy in which Spiegelberg's criteria had been fulfilled. He also showed a calcified dermoid which had caused no symptoms.

CHELSEA CLINICAL SOCIETY.

THE annual general meeting of this Society was held at the Rembrandt Hotel on May 20th, with Mr. L. A. HARWOOD, the President, in the chair. A discussion on

SLEEP

was opened by Dr. S. A. KINNIER WILSON who said that the curious paradox of sleep was that its disorders were familiar, while its mechanisim was little understood. Sleep disorders were becoming more common, a large number of cases being associated with encephalitis lethargica, whose appearance in 1919 reawakened interest in the whole subject. Hypersomnia used to be very rare, but was now often seen in encephalitis, being sometimes the only early symptom. Invasion of the sleep rhythm was another novel disorder, an organic affection revealing itself in a disturbance of function. It was incorrect to speak of a "sleep centre." Sleep was a process in time and could not be localised by static or anatomical rules, any more than the tune in a musical box could be localised. On the other hand, there was evidence that sleep was disturbed in encephalitis and brain tumours, especially when the lesion was at the floor of the brain in the third ventricle, by the stalk of the pituitary. Oversleeping must be a positive symptom—the overworking of the sleep mechanism. The tumour could not be destroying the sleep mechanism; it must be causing it to overact. Pavlov had shown that after a certain number of repeated stimuli, the reflex arcs ceased to respond and the animal fell asleep. Sleep, according to this great authority, was merely inhibition. When it descended to the lower centres, the organism fell asleep; when it was spread over the cortex, the symptom of catalepsy or trance was produced.

In recent years another disorder of sleep had appeared — narcolepsy. Sir William Gowers had referred to it in 1907, but Dr. Wilson said that he had never seen a case until 1926, since when he had seen over a score. The reason was unknown. The patient suffered a fit of sleep, and at once reawoke; the phenomenon was a kind of epileptic attack of sleep, not connected with Fröhlich's syndrome or pituitary tumour. It was related to cataplexy, in which the limbs gave way on hearty laughter or apprehension. This phenomenon was an extreme form of the familiar slackening of motor control due to emotion. Dr. Wilson hinted at an association between this syndrome and encephalitis lethargica. A large number of patients put on weight, sometimes two and a half stone in a year. In cataplexy the deep reflexes were completely abolished, to return immediately the attack was over. During the attack the patient was an organic case. The value of reflex tests, said Dr. Wilson, was thereby rendered very doubtful, and the evanescence of these signs, which he had always considered constant and immutable, in these cases had completely altered his attitude to them. They could only be dynamic and physiological changes occurring in mechanisms. We should not, he said, talk so much of diseases, but more of reactions to stimuli. Symptoms, even that of sleep, were signs that the mechanism producing them was active and healthy; this view of nervous symptoms was more interesting and threw a truer light on nervous diseases than the present concept.

Sleep in General Practice.

Dr. P. SEYMOUR-PRICE said that the chief difficulty of the clinician investigating sleep disorders lay in obtaining a reliable account of them. No one really knew exactly when he went to sleep, and it was common to wake up refreshed after two hours' sleep. The evidence supplied by a patient was still less trustworthy. Sleep was a relative term, and it was easy to acquire the habit of doing with very little. Voluntary insomnia for several nights had been shown to produce no symptoms beyond a certain lack of concentration, which a good night's sleep would restore. Insomnia was often, like diet, a fad, a phobia, and a fetish, and became itself the cause of sleep disorder. There seemed to be a newspaper conspiracy to suggest insomnia to the public. The reason for the high incidence of sleep disorders was a general increase in worry, excitement, or anxiety; the times imposed hurry and forbade leisure. The ordinary type of insomnia was associated with slight nerve exhaustion, fatiguability, and indigestion. It was no use trying to go to sleep or counting sheep; the patient should let himself glide to sleep.

Insomnia was a habit, and any simple sedative plus suggestion would often work a cure. His formula was a cachet containing grs. 5 each of aspirin and sodium bicarbonate, but the aspirin should be given its chemical name.

Dr. Seymour-Price had never known any ordinary sedative form a habit. Nevertheless, prescriptions should be for a limited amount and be marked *ne rep.*, as they were otherwise usually handed on. The tolerance some patients acquired to hypnotics was extraordinary. He had known a patient drink, without harm, half a pint of bromidia, which could be obtained in this quantity without a doctor's certificate. Few patients really needed a prescription; most of them wanted advice, not drugs. A hyperpietic could be bludgeoned into sleep with a powerful narcotic, but unless the condition was treated this practice was unsound. Many patients took grs. 10 of medinal night after night for months, but a drug which would produce artificial sleep in this way must produce moral, mental, or physical degeneration, or all three. Such patients were in a chronic state of intoxication, slept very poorly, and were inert and apathetic. Even bromide, given for long enough—except for definite conditions, such as epilepsy—did irretrievable harm.

Much spade-work of suggestion was needed from the profession. Fear of insanity, fear of the dark, fear of sleep because it imitated death, fear of drugs as habit-forming, were all very common obstacles to treatment. They could not be dealt with by articles in the lay press; what was needed was the treatment of each case on its merits—the *argumentum ad hominem*. The public were on the whole utterly ignorant of the laws governing the important functions of diet and sleep, and it was the business of the profession to educate them.

Discussion.

Mr. RALPH THOMPSON asked if the limbs of a sleeping man became atonic, how it had occurred that in the retreat on Corunna a large number of soldiers had marched asleep. There was great difference between the tone of sleep and of paraplegia. He asked for explanation of the fact that ten minutes' sleep was as refreshing as ten hours'. He had once been deprived of sleep for three weeks by a painful affection of the knee, no drug being of any use, but had not suffered any particular harm. He recommended in difficulty the imagination of a black target in a black landscape. He did not believe that drugs such as aspirin formed a habit in a person of common sense. He asked whether the knee-elbow position of some healthy children in sleep was a phylogenetic reminiscence of arboreal life.

Dr. G. MURRAY LEVICK remarked that it was as well not to place too much credence in the report of the night-nurse. A patient lying still and awake was often reported asleep. The patient was the more trustworthy witness, unless the night-nurse made a very careful examination. Patients nursed in bed had no fatigue products, which played a large part in producing sleep.

Dr. G. T. CREGAN asked if it was harmful to become accustomed to sleeping in a noisy thoroughfare.

Dr. GORDON LANE said that no one who retained normal sensory faculties lost hearing in sleep. No one from birth to death ever lost all connexion of the soma with the environment. The auditory faculty was the sentinel of the organism. The subconscious mind discriminated between important and unimportant noises, and the unimportant did not affect the sleeper.

If the salt used in mental hospitals were cut down, fewer hypnotics would be needed. The sodium-ion content in the blood was the conducting medium of psychical reflexes; if toxic products poisoned that reflex arc, sleep was lost. No particular drug dealt with sleeplessness. If the sodium content were sufficiently reduced, bromides were effective; otherwise they were not. Pavlov had said that bromide was not a sedative but an excitant to the centre which cut out exhausting stimuli.

Replies.

Dr. WILSON, in reply, said that narcoleptic patients went to sleep standing; they did not suffer from atony, for they were not in deep sleep. There were all degrees and kinds of sleep. The question of depth of sleep was important; ten minutes' sleep was not always refreshing and, even if it were, it did not make up for length of sleep. The knee-elbow position of the infant was not, he thought, a reversion to an arboreal type; it probably had something to do with flow of blood to the head, pressure of viscera on venous channels, and getting away from light. To know when a stimulus changed its action on an arc from awakening to narcotising would be a clue to the mystery of sleep. He did not agree that a self-preservative mechanism was necessary in sleep, nor that the brain could reject unimportant sounds as a matter of course. If we could cut out auditory stimuli, especially on busy thoroughfares, our sleep would be much deeper.

Dr. SEYMOUR-PRICE, also in reply, recommended a contrary suggestion, that of keeping awake. Noise was entirely a question of habit; men had often slept through heavy shell-fire. Silence might be more disturbing than accustomed noise.

New Inventions.

A NEW CAPSULE FORCEPS.

ONE is apt to fail in doing a satisfactory capsulectomy from the teeth of the forceps refusing to bite into the capsule, this being specially the case in hypermaturity from toughness of the capsule or fluidity of the cortex. A more vertical inclination of the teeth to the capsule than is possible with the

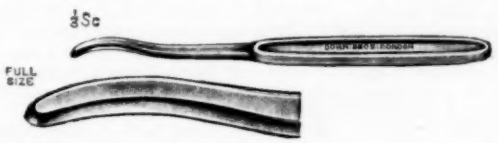
usual pattern of forceps, thus giving a better grip, is obtained by setting the teeth on short primary arms, which in turn are opened and closed by long secondary arms. The latter, as shown in the illustration, are given a ring grip, and provided with a screw stop to limit the distance to which the teeth can separate to a distance not exceeding 3 mm. The heels of the short arms are not only separated to the extent of 1 mm., but are raised 1 mm. above the level of the teeth, so that they cannot possibly grasp the iris.

The makers are Messrs. Down Bros., Ltd., 21 and 23, St. Thomas's-street, London, S.E.

G. F. ALEXANDER, M.B., C.M. Edin.

A MODIFIED FORM OF FARABEUF'S RASPATORY.

THE illustration shows a modified form of Farabeuf's raspatory. The standard form of rugine designed by Farabeuf, of Paris, for use on the long



bones was found to bring the hand somewhat inconveniently near the work, while the longer rugines designed by Pierpoint and Mitchell are rather heavy for fine work round the orbit, and it is thought that the rugine here referred to will be found convenient for delicate and precise work which falls to the lot of an ophthalmic surgeon. Messrs. Down Bros., Ltd., 21 and 23, St. Thomas's-street, London, S.E., are the makers.

J. N. DUGGAN, F.C.P.S. Bombay, L.M.S., D.O. Oxf.

WEEKLY PAYMENTS FOR MEDICAL SERVICE.—An association has been formed at Stockton-on-Tees, and has already begun work, which provides for the attendance of a family doctor in return for payments ranging from 6*d.* per week for one adult to 9*d.* per week for one adult and three or more dependents. The organisation embraces the boroughs of Stockton and Thornaby, and the neighbouring districts of Billingham, Haverton Hill, Port Clarence, Eaglescliffe and Yarm, and up to the present 22 medical men have joined it. The object of the service is to coördinate the provision on a contract basis of medical attendance and treatment for uninsured persons and the dependents of insured ones.

Reviews and Notices of Books.

THORACIC PUNCTURE FLUIDS.

The Clinical Pathology of Thoracic Puncture Fluids. By S. ROODHOUSE GLOYNE, M.D., D.P.H., Pathologist, City of London Hospital for Diseases of the Heart and Lung. London: John Bale, Sons and Danielsson, Ltd. 1930. Pp. 83. 10*s.* 6*d.*

THERE has long been a demand for a book of this type, and Dr. Gloyne has succeeded in presenting one small in size, clearly written, and containing just the information that the average practitioner requires. The chapters dealing with the anatomy, physiology, and pathology of the pleura are of considerable importance. The lymphatic system is a closed one and a layer of endothelium intervenes between the capillary blood-vessels and the lymph vessels, so that organisms from an infected pleura cannot pass readily through the lymphatics to the mediastinal glands. It is for this reason that suppurative mediastinitis is a rare condition. The method of making an exploratory puncture is explained in detail. The syringe should be sterilised by boiling, and no antiseptics should be used if a bacteriological examination is required. Clotting of the exudate should be prevented by sodium citrate. The importance of a cytological examination is discussed, and the reader is warned that an excess of lymphocytes, although usually indicating a tuberculous infection, does not necessarily do so. The author suggests the term "small round cell" for general use instead of lymphocyte, since the origin of these cells is uncertain. A very full account is given of the means by which tubercle bacilli can be found in some of these effusions. Their detection is largely a matter of careful search; the longer the search the higher the percentage of cases in which the bacilli are found.

In the effusion which follows spontaneous pneumothorax a considerable number of polymorphonuclear cells are generally combined with tubercle bacilli, and this is of importance in diagnosis. A full account of the bacteriology of pleural fluids is given, and the methods of staining are carefully described. An interesting chapter deals with rare types of effusion such as cholesterol, chylous, and fluids found in hydatid disease. The last chapter deals with autoserotherapy. Dr. Gloyne points out that whilst this is always of very doubtful benefit, it may even be dangerous; and the reader is warned against injecting fluid containing tubercle bacilli. The book concludes with a good bibliography and index.

The work is excellently constructed and quite up to date. It should appeal to the busy practitioner who will find in it useful information and clear instructions how to conduct some of the more simple examinations.

PREPUBESCENT SYPHILIS.

By PHILIP C. JEANS, A.B., M.D., Professor of Pediatrics, Iowa University School of Medicine; and JEAN V. COOKE, A.B., M.D., Associate Professor of Pediatrics, Washington University School of Medicine; Supervising Editor, ROYAL STORRS HAYNES, Ph.B., M.D., Clinical Professor of Diseases of Children, College of Physicians and Surgeons, New York City. London: D. Appleton and Co. 1930. Pp. 295.

THIS book is one of a series of volumes issued under the general title of Clinical Pediatrics, of which Prof. Royal Storrs Haynes, of Columbia University, is supervising editor. The analytical record here supplied of the authors' experience of more than 1500 cases of syphilis in children observed during a period of 16 years will be widely appreciated. This is a considerably larger group of cases of inherited syphilis than any yet reported, and it is noteworthy, though this was to be expected, that the incidence is at least two and a half times as great amongst coloured as amongst white infants. The book opens with an interesting chapter, containing excellent portraits of outstanding syphilologists, on the history of syphilis—particularly of hereditary syphilis. The brilliant investigations of Ehrlich and Hata in the domain of chemotherapy hardly receive adequate recognition in the statement that "after many fruitless trials Ehrlich at last hit upon what we now know as arsphenamin." Chapters on the ætiology and pathology of syphilis, with special reference to the laboratory examination of the blood and cerebro-spinal fluid, give sufficient information without going too deeply into technicalities. The upper limit of the normal cell content of the fluid is given at ten per c.mm. This is at least double the figure usually accepted in this country, though admittedly one may occasionally come across a cerebro-spinal fluid with a cell count of ten per c.mm., and with no other abnormal feature. The chapters on the transmission of syphilis by inheritance and the familial effects of syphilis, with the social aspects, are full of interest, and that dealing with the social aspects stresses the damage done to families by syphilis and its great cost to the State. The clinical description of the early and late manifestations of the disease are well given, and the large amount of material upon which the authors base their analyses gives weight to their percentage occurrence of symptoms. It is curious that they had only two cases of paroxysmal hæmoglobinuria amongst their series of over one thousand cases of congenital syphilis. We find no references in this book to the eczema oris described by Leonard Findlay, to the syndrome of Hennebert (nystagmus and giddiness on applying pressure to the external auditory meatus), or the possible effects of congenital syphilis upon the endocrine glands. The chapter on neurosyphilis is particularly valuable; the high incidence of congenital neurosyphilis is not sufficiently appreciated. Table XXVIII. is difficult to follow. The chapters on diagnosis, prognosis, and treatment are very good, but it would have been a convenience to British practitioners if the European equivalents of the "arsphenamin" products had been added in the text or a footnote. The bismuth preparations bistovol, bismuth-oxychloride, are also omitted, and even the names (salvarsan and neo-salvarsan) originally given by Ehrlich to the preparations "606" and "914" are nowhere to be found in the volume.

The book is well printed and produced and fully illustrated, though some of the illustrations of the skin lesions are not very informative. A few coloured illustrations would have still further enhanced the value of the book, which is a most useful addition to the literature of inherited syphilis.

DISEASES OF THE EAR.

Fourth edition. By PHILIP D. KERRISON, M.D., Consulting Aural Surgeon to the Manhattan Eye and Ear Hospital. London: J. B. Lippincott Company. 1930. Pp. 627. 35*s.*

THE fourth edition of this admirable text-book contains few additions or alterations, compared with the third edition which appeared seven years ago. New matter includes a description of Sir Charles Ballance's work on the treatment of facial paralysis by anastomosis of the facial and glosso-pharyngeal nerves. Dr. Kerrison also now provides a fuller account of the various surgical measures which have been proposed for the treatment of otitic purulent meningitis. These methods include repeated lumbar puncture, dural puncture, through-and-through cerebro-spinal lavage, and drainage of the cisternal magna. Dr. Kerrison believes that none of these methods increases the patient's chances of recovery, and that most of them add to the danger of spreading the infection; he prefers free exposure of middle and posterior fossæ from the mastoid area, with incision of the dura if under tension, and, if labyrinthitis is present, drainage by simple removal of the

promontory. We would suggest, for a future edition, a more systematic description of the characteristics of the normal cerebro-spinal fluid, and of its modifications in various forms of meningitis and in other diseases. A new chapter has been added which deals in a sympathetic manner with the training of the totally deaf child; it is not stated at what age systematic education should be begun.

As we noted when reviewing the third edition, this book is a model of what a text-book should be, for it contains a careful and thorough description of examination methods, providing elementary knowledge which the student should and the practitioner must possess, and gives details about the more obscure conditions which the specialist requires.

Surgical Treatment in Tuberculosis.

Traitement médico-chirurgical des pleurésies purulentes tuberculeuses. By F. Dumarest, M. Guilleminet, and P. Rougy. Paris: G. Doin et Cie. 1930. Pp. 42. Fr.16.

Until recently surgical intervention was almost the only thing *not* to advise in a case of tuberculous empyema. It is now recognised, however, that the best results are obtained by collaboration between the surgeon and the physician. In this book the authors make the following annotated classification: 1. Cold abscess of pleural cavity with or without pneumothorax. In this condition the general health of the patient remains good and the treatment consists in occasional aspirations. 2. Tuberculous empyema associated with pyrexia and malaise. Here the essential treatment is pleural lavage. 3. Septic tuberculous effusion. In this type secondary infection has occurred, and there is often a pulmonary or parietal fistula. Intercostal drainage is often the best treatment, and a subsequent thoracoplasty may be necessary. The technique of the various operations mentioned are briefly described and the X ray plates are well produced.

The book gives a concise account of the modern treatment of tuberculous empyema and forms a useful addition to the literature on the subject.

Internal Diseases.

The George Blumer Edition of Billings-Forchheimer's Therapeusis of Internal Diseases. Supplement. Edited by George Blumer, M.A. Yale, M.D., David P. Smith Clinical Professor of Medicine, Yale University School of Medicine. London: D. Appleton and Company. 1929. Pp. 760. 30*s*.

Dr. Blumer has in this volume brought up to date his edition of the Billings-Forchheimer's Therapeusis which was first published in 1924. The contributors have now added such supplementary material and corroborative data as the progress of the past few years has made necessary. The result is a striking commentary on recent advances in therapeutics, even though the authors as a whole have not found much occasion to modify their articles of 1924. For the most part the chapters in this book are self-contained and the reader will find no call to refer back to the original text of 1924; a few, however, are essentially supplementary. The subject matter of the articles here collected range from such matters as the surgical treatment of angina pectoris and of diseases of the heart and pericardium to the problems of serum therapy and vaccination. George Minot contributes an authoritative paper on the treatment of pernicious anæmia, in which he urges that the best results will be obtained when large doses of the liver substance are prescribed rather than small doses "sufficient to create pronounced improvement and permit a continued fairly satisfactory sense of well-being," and that additional amounts should be given in the presence of associated infections. In other types of anæmia he suggests trial for a period of weeks of a régime of liver and iron with a proper supply of other foods. A valuable list of references is included in this contribution. D. Marine contributes a concise account of the views of American workers upon the use of iodine in the treatment of thyroid diseases; for exophthalmic goitre he suggests that small doses may be continued "for one or three months," whilst large doses should only be used in those cases which are to be operated upon within two weeks after its administration is begun; no comment is made upon the prolonged usage of large doses which has recently been advocated. Other chapters of interest to the general physician are those dealing with quinidine, novarsurol in cardiac œdema (a note on its dangers in renal cases is included), protein shock therapy, malarial treatment of general paralysis, and the treatment of heart disease. There is little new to be found in the articles on the treatment of nephritis or of cirrhosis of the liver. Insulin therapy is adequately dealt with, but little mention is made of its applications in non-diabetic conditions. The plan of treatment of obesity described in some detail by Burgess Gordon is one that has as yet hardly received sufficient confirmation; its main feature lies in the reduction of potatoes and all foods derived from grains and the administration *between meals* of divided doses of dextrose. Collapse therapy in pulmonary tuberculosis is discussed in considerable detail (W. B. Soper), as are the various branches of serum therapy, particularly the specific treatment of lobar pneumonia.

On the whole the attitude of the authors has been a properly critical one, and all who wish for a concise summary of recent advances in the main branches of internal medicine would be well advised to read this volume. The illustrations are numerous and excellent and the lists of references at the end of each chapter are valuable.

Nursing and Diseases of Sick Children.

By Various Authors. Edited by Alan Moncrieff, M.D., M.R.C.P., Medical Registrar and Pathologist, Hospital for Sick Children, Great Ormond-street. London: H. K. Lewis and Co., Ltd. 1930. Pp. 580. 15*s*.

Diseases of Children for Nurses. Sixth edition. By Robert S. McCombs, M.D., Children's Hospital of Philadelphia. London: W. B. Saunders Co., Ltd. Pp. 594. 12*s*. 6*d*.

The additions which have been made to the nurse's curriculum during recent years have been a matter of general, if not always of favourable, comment. But even those medical men who regard detailed knowledge of medicine and surgery as unnecessary for nurses will welcome books, such as these, which will facilitate the acquisition of knowledge now required by statute. No more eloquent testimony to the high professional level at which nurses are expected to aim on both sides of the Atlantic could be found than the issue of these books.

The first of them is new, and has been compiled by Dr. Alan Moncrieff with due regard for the syllabus of the examination for the Supplementary Part of the Register for Sick Children's Nurses. Following this syllabus, the work includes sections on nursing, and on both medical and surgical diseases of children. The subject matter has been admirably handled, and has yielded a volume which is well representative of the great pædiatric training centre from which it comes. The principal collaborators are Miss M. A. Fussell, Sister Tutor of the hospital, Mr. Twistington Higgins, Mr. Eric Lloyd, Dr. B. E. Schlesinger, and the Editor; Mr. P. G. Doyne has contributed a chapter on diseases of the eye. A useful feature is an appendix containing essential facts about drugs in common use. This book will be valuable to candidates for the General Nursing Council examination, and may be recommended to members of the nursing

profession engaged in private practice who have had no special training in diseases of children. There are few omissions of any importance, but in a future edition the nursing of infections of the frontal and ethmoid sinuses should be discussed.

Dr. McCombs's text-book has reached its present level by a process of successful evolution, having passed through six editions since its original publication in 1907. The new edition has been enlarged and brought thoroughly up to date. This book is devoted exclusively to medical diseases, the account of the nursing of each disorder following the clinical descriptions. The style of the text is simple and lucid, and the information accurate. Among the best features of the book are the illustrations, which include a number of colour plates.

LONDON HOSPITAL PAPERS.

Researches Published from the Wards and Laboratories of the London Hospital during 1929. London: H. K. Lewis and Co., Ltd. 7*s.* 6*d.*

THIS volume contains 48 original papers selected from the published communications of London Hospital authors during the year 1929. A great variety of subjects are treated. Mr. Hugh Cairns has two papers on the subjects of intracranial tumours and head injuries. Dr. Donald Hunter writes on hyperparathyroidism and Dr. O. Leyton on the administration of insulin in suspension. In addition to the articles of surgical, medical, neurological, and histological interest, the volume contains a series of four papers on the filtrable viruses by Dr. S. P. Bedson and Dr. J. O. W. Bland, two on the tetanus bacillus by Dr. Paul Fildes, and a large number of important biochemical papers by Dr. John Marrack, Mr. F. L. Hewitt, Mr. H. D. Kay, Dr. Campbell Smith, and others. The consistently high standard of the contributions here collected, together with the wide and important field of medical subjects concerned, makes the collected work of interest not only to members of the London Hospital but also to all students and teachers who are occupied in promoting the advance of medicine. The book is, moreover, a tribute to the scientific vigour of the medical school from which it comes.

RECENT ADVANCES IN PLANT PHYSIOLOGY.

By E. C. BARTON-WRIGHT, M.Sc. Lond., Lecturer in Botany in the University of London, King's College. London: J. and A. Churchill. 1930. Pp. 352. 12*s.* 6*d.*

THE compiler of a volume dealing with recent advances in any branch of science is confronted with the difficulty of selection; Mr. Barton-Wright admits that he has been guided entirely by his own predilections in deciding what is important work, and on the whole we do not cavil at his choice. He has divided his subject matter into six chapters, dealing respectively with the soil and water relations of the plant, transpiration, translocation and root pressure, carbon assimilation, nitrogen metabolism, respiration, and the physiology of growth. In the first chapter he gives a somewhat brief review of the much debated question of soil acidity and also of the base exchange, while the investigations of Weaver in America on the ecological and physiological characters of different root systems receive fairly extensive consideration. In the second chapter will be found a useful account of the question of the mechanism of the ascent of cell sap with a criticism of Bose's vital theory of pulsatory activity which should help to clarify ideas about Bose's rather sensational deductions. The same chapter also contains an account of the subject of translocation, including the work of Mason and Maskell in Trinidad on the cotton plant. The chapter on carbon assimilation is perhaps the least satisfactory of the six, containing on the whole little information that cannot equally well be found in most of the more recent text-books. In the chapter dealing with respiration the student should be grateful to the author for an account of the researches of Blackman and Parija which in the original are rather difficult to disentangle. The last chapter covers a large field, and includes a consideration of much recent and widely scattered literature which has not yet entered the text-books. Though his enthusiasm has at times led Mr. Barton-Wright to criticise the work of others in a manner which does not seem justified, he has produced a useful book obviously founded on extensive reading.

THE BRIDLE OF PEGASUS.

By WARREN R. DAWSON, F.R.S.E. London: Methuen and Co., Ltd. 1930. Pp. 203. 7*s.* 6*d.*

THIS book, dedicated to the learned author of "The Golden Bough," is addressed equally to the medical profession and to the public. The studies of magic, mythology, and folk lore are well selected in subject and well set down, while a profuse bibliography shows the author to be widely read. As a result he has been able to bring together some interesting tales illustrating popular beliefs whose history reaches back to primitive times, and whose precepts are even yet rooted in the minds of the more uneducated and simple of all populations. The volume is made up of eight separate and independent studies, but the different essays have this in common, that they reveal certain efforts of primitive man to control the forces of nature by magical aid. A word of praise should be added for the scrupulously careful way in which the full references are given.

NOTABLE BRITISH TRIALS.

Trial of George Chapman. Edited by HARGRAVE L. ADAM. London: W. Hodge and Co. 1930. Pp. 223. 10*s.* 6*d.*

George Chapman, alias Severin Klosowski, hanged in 1903 for the murder of Maud Marsh, forms the subject of the fiftieth volume in Messrs. Hodge's Notable British Trials Series. Dr. Thomas Stevenson, the Home Office expert, was called to prove that Maud Marsh died of antimony poisoning. His evidence of the similar deaths of Mrs. Spink in 1897, and Bessie Taylor in 1901 (with each of whom Chapman had lived), was admitted for the purpose of negativing any suggestion of accident in the Marsh case. Up to a point Chapman was fortunate in his victims' medical attendants; Mrs. Spink's death was attributed to phthisis, and Bessie Taylor's to "exhaustion from vomiting and diarrhœa" with no suspicion of foul play. The uninquisitive attitude of the doctors was criticised by Mr. Justice Grantham, whose characteristic summing-up (delivered in days before the Court of Criminal Appeal was established) almost took the guilt of the accused for granted. Mr. Hargrave Adam's adequate, if sometimes diffuse, introduction mentions the possibility that Chapman was identical with Jack the Ripper. The main ground for their suggestion is Chapman's presence in London, and indeed in Whitechapel, during the period of the Ripper murders; similar murders are said to have occurred subsequently in Jersey City at a time when Chapman was in that part of America, and to have ceased when Chapman returned to England. This argument from opportunity will probably not convince those who hesitate to identify an antimony poisoner with the madman who had mutilated a number of unfortunate women ten years earlier. If the letter and card received by the police in 1888 were the authentic writing of the Ripper, could the writer have been Chapman, who in 1903, was unmistakably illiterate? Officials like Sir Melville Macnaghten have, as Mr. Adam says, claimed to have penetrated the Ripper mystery. But they leave us no wiser. A constable had a chance to catch the murderer red-handed on one occasion, but turned violently sick at the ghastly sight of the corpse and so the Ripper got away.

THE LANCET.

LONDON: SATURDAY, MAY 24, 1930.

REGIONAL HOSPITAL ORGANISATION.

THE Merseyside Hospitals Council, which organised and administers the contributory fund for the Liverpool hospitals, has issued a memorandum upon a subject which cannot fail at an early date to engage the serious attention of every person concerned with hospital policy. It deals with the organisation of hospital services in south-west Lancashire, Cheshire, and North Wales, and has been called forth by the heavy demands now made upon the Liverpool hospitals, and especially the teaching hospitals, from districts outside the scope of the fund. Patients from those districts, which include the Isle of Man, last year cost the Liverpool medical institutions a net sum exceeding £16,000, after allowing for contributions by them or on their behalf and subscriptions known to have been received from their areas. That is to say, the Merseyside contributors are paying part of the cost of hospital treatment and maintenance of "foreigners" in much the same economic condition as themselves. This, in itself, is a serious situation, but the financial is really less grave than the medical aspect of the matter. The swamping of beds results in the creation of waiting-lists which would otherwise be of comparatively small proportions. The Liverpool beds would be inadequate in any event, but this pressure from areas distant more than ten miles from Liverpool town hall intensifies congestion without bringing compensation. The unfairness of the burden is obvious; the difficulty is how best to remove it. It is essential to bear in mind that the object of the Liverpool penny-in-the-pound fund, like all other contributory schemes, is not merely to improve finance, but to increase the medical efficiency of the hospitals. To ban the "outsider" is clearly unthinkable. The smaller centres cannot possibly provide the resources either of personnel or equipment of a large town which is the seat of a medical school; the avenues of access to these advantages must therefore be kept open to the whole of the region which looks to a particular hospital centre.

In the opinion of the Merseyside hospital council the only way out of the difficulty is the establishment of contributory schemes similar to its own in suitable centres of the outer zone. This need not be a very elaborate process, since four such schemes ought to suffice—West Lancashire, centring on St. Helens, Widnes, or Runcorn; Deeside, centring on Chester; north-east and north-west Wales, centring the one upon Wrexham and the other upon Bangor. These regional councils might be federated, or affiliated, with the Merseyside council, and in dealing with their finances they would necessarily take into account not only the cost of maintaining the patients they sent to Liverpool, but the overhead costs of the teaching hospitals. This, however, is to solve only a part of a problem which will rapidly grow more insistent. How can the best use be made of the hospital services, of varying importance, which already exist in these outside areas? If the Liverpool hospitals can do what even the larger local ones cannot do, the smaller ones, in their turn, are dependent for special services upon the more central institutions of the district. Those institutions would form the natural core of a regional system which would always have a head-centre to which it could turn when the highest skill or special equipment was necessary. To work successfully such a system would need a measure of elasticity which there is no need to suppose would be lacking. The existing haphazard and unsystematic state of things is always wasteful and sometimes dangerous. Either the costly equipment of a local metropolitan hospital is used for cases which do not require it, or its employment may be perilously delayed in cases in which it is essential.

Results of practical importance to national hospital policy may be expected to follow the issue of this memorandum, which is intended to form the basis of discussion at a series of conferences to be convened by the Merseyside Hospitals Council. The difficulties which are being so keenly felt at Liverpool are likely to be, if they are not already being, felt in other great centres. It would seem that the contributory scheme bids fair to be the financial basis of the voluntary hospital service for a long time to come, in the absence of revolutionary changes of which there is at present no sign. Wherever these schemes have been established they have not only succeeded, but succeeded in a measure and with a rapidity that has been startling. Sheffield and Birmingham, Leeds and Liverpool, to mention only some outstanding instances, to which the Hospital Saving Association in London may be added, are raising much of their hospital revenue from the pence of the artisan. But the benefits of these pence are everywhere being claimed—and enjoyed—by those who do not subscribe them, and there are large areas, even in the industrial north and midlands, where there are no contributory schemes. Sometimes, too, there are large, but not teaching, general hospitals just outside the area of a scheme which are yet not infrequently beholden to it. Sometimes, moreover, it has been complained that a contributory scheme has invaded territory which believes that, with its own excellent hospital, it is sufficient to itself. Regional coördination of contributory schemes will rapidly become imperative if they are not to be left suspended in mid-air. The delimitation of boundaries will not only be for the advantage of existing schemes but will be likely to encourage the formation of others. This step is, indeed, a necessary part of that systematising of the voluntary hospital service which has been imposed upon it by recent events. The existence of a highly organised municipal service side by side with a casual and unsystematised voluntary service would involve perils which grow in gravity the more closely they are looked at.

THE FUNCTION OF THE AUTONOMIC SYSTEM.

THE function and arrangement of the autonomic system used to be one of those branches of knowledge which the medical student was at liberty to forget as soon as he had passed his preclinical examinations. The system was known to play an important part in the internal economy of the body, but disorders of the autonomic nerves seemed so rare or the symptoms of them were so obscure that little interest was taken in them even by neurologists. The position has certainly altered to-day. It is true that it needs a bold man to diagnose vagotonia, that the surgery of the sympathetic is still in the experimental stage, and that the hypothalamus is still regarded as a region

of the brain best left alone; but there is no doubt that disorders of the autonomic system do exist and that they may become amenable to treatment.

Prof. CANNON'S Linacre lecture at Cambridge gives an account of the autonomic system which differs strikingly from much that has been written on the subject. It is an authoritative statement based on experimental work in which a high standard of accuracy has been required, and it gives a clear picture of the work which is normally carried out by the autonomic nerves and of the results which follow from their removal. In his discussion of the double nerve-supply of the viscera, Prof. CANNON draws an interesting contrast between the cranial and sacral, or parasympathetic, systems and the opposing sympathetic. He points out that the cranial and sacral nerves are arranged to produce a number of distinct and independent reactions—e.g., constriction of the pupil, salivary flow, slowing of the heart—whereas the sympathetic, with its overlapping connexions, gives a general diffuse activity in the opposite sense over a very wide area. By the simultaneous action of the two systems any special viscus can be separately affected in either direction, but the diffuse action of the sympathetic ensures a widespread discharge when the stability of the organism is threatened. This function of preserving the "homeostasis" of the body—i.e., of preserving a constant internal environment in spite of the activities of the animal and of its surroundings—is the main concern of the sympathetic system, aided by the discharge of adrenalin which accompanies sympathetic activity. By regulating the peripheral vessels and the sweat glands, the system helps to preserve a constant internal temperature, it causes a discharge of sugar from the liver and of red blood corpuscles from the spleen, if either are needed to increase the capacity for muscular exertion, and in face of injury it checks the bleeding and prevents any reduction in the flow of blood through the heart and brain. There are, of course, many other systems concerned in maintaining the internal environment, but a nervous mechanism occupies a peculiar position in that it is linked to the brain and so can be brought into play when danger threatens, but before the actual moment for combat or flight has arrived.

The total removal of the sympathetic system naturally reduces the efficiency of the animal, but the remarkable fact brought out by Prof. CANNON'S experiments is that the reduction becomes a serious matter only when extreme conditions have to be faced. When animals are totally sympathectomised they become exhausted more rapidly by severe muscular work, because the vascular system is no longer adjusted to meet the increased demand. Sugar is no longer liberated from the liver during emotional excitement and the spleen fails to contribute its reserve of erythrocytes. But with all this the animals are able to live comfortably in the sheltered conditions of a laboratory. There is a negligible change in the basal metabolism and unilateral sympathectomy produces no change in the rate of growth, in the muscular tone, or in the resistance to fatigue on the affected side of the body. No doubt some of these negative results will not go unchallenged, but the fact remains that the sympathetic seems to play a relatively unimportant part as long as the animal lives under conditions "where there are no marked temperature changes throughout the year, no necessity of struggle for food, no requirement of escape from enemies, and no danger of hæmorrhage." As Prof. CANNON points out, this is a very special and limited sort of existence for an animal, and it would be a mistake to belittle the importance of the sympathetic for the proper functioning of the body. But man has so much control of his external environment that his life is more like that of a laboratory animal than of one set free to look after itself in the open. We regulate our body temperature by clothing ourselves and heating our rooms; many of us have no need to undertake exhausting muscular work, and the struggle for food is a mental rather than a physical struggle. The sympathetic system is clearly not as essential to our well-being as it would be to that of a wild beast. Parts of it have now been removed in man for the relief of various disorders ranging from spasticity of the muscles to angina pectoris. The theoretical basis for many of these operations has been extremely uncertain and the results are difficult to assess, but at least it seems to be true that very little harm has come from the excision of sympathetic ganglia except in some of the operations for angina. Intractable pains have undoubtedly been relieved, and a more exact knowledge of the nervous pathways may increase the percentage of successes, though it may reduce the number of cases in which an operation seems advisable. In any event, the possibility of surgical interference with the sympathetic system has opened up a new line of attack on various disorders of blood-vessels and viscera, and if an animal can lead a comfortable though restricted life after the loss of its entire sympathetic we need not be horrified at the thought of its partial removal in man.

SANATORIUM AND AFTER.

TUBERCULOSIS illustrates, as nothing else in medicine, the operation of social circumstances. There are at the present time some 15,200 beds provided in England and Wales for the sanatorium treatment of pulmonary tubercle, the value of which in improving the general health is now beyond dispute, although many of the patients on leaving the sanatorium are still unfit to go back to work at their old occupations. This must account for the tendency, particularly noticeable last year,[1] to increase the duration of residence beyond the usual period of six months. In America at least one half of ex-sanatorium patients are reabsorbed at once into ordinary industry, but the proportion is certainly not so large in this country and is probably nearer 40 than 50 per cent. It depends largely on the operation of social circumstances. In times of industrial depression it is well-nigh impossible to find openings for ex-consumptives, but the qualms about taking them on again are subdued in times of industrial prosperity. Re-entry of such a worker into the industrial market postulates a high degree of intellectual capacity at some particular job, for he no longer possesses the essential requirement of an unskilled labourer which is a high standard of physical fitness. The position challenges all who are concerned with after-care to raise by every means the percentage of those whose skill entitles them to be reabsorbed into industry. The scheme for technical education of suitable youths between the ages of 14 and 19 undertaken by the National Association for the Prevention of Tuberculosis under the supervision of the Surrey Education Committee is one useful step in this direction. Taken by and large there is, however, little hope economically for the consumptive unless he is able to resume his previous occupation.

[1] See Ministry of Health Memorandum, 131 b/T.

But what of the remainder? There are, as the Employment Committee of the Joint Tuberculosis Council indicates,[2] three other channels into which the consumptive may be steered in attempting to land him on economic ground. He may be employed under an authority, State-aided or voluntary, in some sheltered position; he may be allowed to work at an urban or municipal workshop; or he may be admitted to one or other of the village settlements specially designed to meet his requirements, medical and economical. Some local authorities, such as those in Hull, Liverpool, London, and Walsall, have turned their attention to the employment of ex-sanatorium patients on the staff and if, as we may now hope, the problem of after-care is vested as a rule in a definite committee, more steady progress may be hoped for in this direction. But the employment of ex-patients on the staff of sanatoriums is a practical proposition already proved; its scope is large, for the total value of staff services rendered in such institutions must amount to at least £550,000 a year. The majority of medical superintendents are in favour of the employment of ex-patients except in the preparation of food, and there are probably over 450 now occupied as nurses, domestics, porters, gardeners, and the like. Few practical difficulties have arisen, and a margin of 10 per cent. of staff is suggested as sufficient to meet the expected breakdowns. The subsidy, whether in labour or money, does not seem to be greater for patients working on the sanatorium staff than for those in workshops attached to settlements. Employment is given only on the distinct understanding that its object is to restore the patient to health and working capacity, and if these posts are reserved for those actually suffering from tuberculosis, and not simply for those who have been diagnosed as such or who have had tuberculosis at some previous period in their history, a wide channel is opened for rehabilitation. After finding so large a use made of so small an industry it is somewhat of a shock to learn that the total number of tuberculous employees engaged in urban workshops in this country probably does not exceed 90 at the present time. Medical results have been satisfactory enough at the Leeds factory-in-the-fields and at the Spero workshops in London, although naturally none of the workshops has been self-supporting. At Leeds it has cost the corporation about £1 a week for every man so employed—care committees have often spent on individual cases much more than this sum without any real economic advantage—but the experience has been too small to decide what subsidy is necessary for workers in such schemes.

Employment in village settlements, the remaining channel to consider, has, in the Committee's opinion, passed from the experimental stage and may be discussed in the light of its contribution to the problem of tuberculosis. The criticism of needlessly high expense comes badly from any local authority which has been relieved by the existence of the settlement from statutory responsibility for an infective individual, and which actually gains by having the house of the sufferer free for a healthy member of the community. Although at Preston Hall the capital expenditure per settler to date is over £500, this is regarded as an outside figure; in any case, money should be forthcoming from rates and taxes for this as for any other branch of the tuberculosis scheme. More cogent is the criticism that the settlement caters only for the few. During the first ten years at Papworth fewer than 7 per cent. of the cases treated were admitted to the settlement, and at Preston Hall during 1925–28 the proportion was a bare 14 per cent. The total number of ex-patients employed in village settlement industries in this country is now only about 340, whereas, if the settlement scheme is to meet all needs, for every sanatorium of 150 beds there should be an absorption rate of 9 patients per month (which would mean at the moment a total of 900) into settlement conditions, a result, the committee remarks, beyond the wildest dreams of the most optimistic. The success of a settlement depends on factors met with but rarely in the realm of medicine and economics. Settlements run on Papworth lines must depend for prosperity on a turnover which is secured in spite of giving to a number of sub-standard individuals the security of tenure denied to healthy workmen in prosperous concerns outside. In view of fluctuating markets, Preston Hall would hesitate to take the risk of indefinite enlargement, and it is probably true that large settlements on similar lines could not be repeated in more industrialised counties, were patients to be drawn solely from surrounding areas with a particular type of technical ability. If the settlement idea is to extend, as it should, each separate unit must grow from a small nucleus, the centre of which will be a scheme for occupational therapy. Places should be reserved for the type of case who would not ordinarily be absorbed into industry in the outside world; the settlement must not come to be a refuge for substandard labour but remain part of the mechanism for continued treatment. Key-men might be allowed to remain on after they could safely find for themselves outside, but it is strictly as a community for restoration to health and working capacity that the village settlement approaches to the perfect solution of the medical and economical problems of the consumptive. Further development might well be in the direction of forming a national association of village settlements as set out on p. 1143 by Dr. VARRIER-JONES of whose pioneer work at Bourne, Cambridgeshire, the modern conception of these settlements is the outcome. Preston Hall and Papworth represent the end-results of that unique experiment, for Dr. VARRIER-JONES took charge of Preston Hall when the British Legion assumed responsibilities there in 1925 and was succeeded in 1927 by Dr. MCDOUGALL to whom the report owes its present form.

[2] Report of the Employment Committee of the Joint Tuberculosis Council on Care and After-care Schemes in Tuberculosis. Signed by Dr. Jane Walker, Dr. D. P. Sutherland, Dr. H. Vallow, Dr. G. Jessel, Dr. P. W. Edwards, Dr. C. O. Hawthorne, and Dr. J. B. McDougall, the last-named being convener of the Committee. May, 1930. 1s. 6d., post free, from the Secretary, Preston Hall, Aylesford, Kent.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION.—Demonstrations will be given at the Miller General Hospital, Greenwich, at 2 P.M. on Monday, May 26th, by Dr. E. C. Warner (selected cases, children), and on Friday, the 30th, by Mr. Arthur Gray (gynæcological operations). Lectures suitable for M.R.C.P. candidates will be given by Dr. B. T. Parsons-Smith, at 11, Chandos-street, W., at 8.30 P.M. on Tuesday, May 27th (Coronary Thrombosis), and on Friday, the 30th (Cardiac Failure). Two courses will be held from May 26th to June 7th—a morning course on Diseases of Children at the Hospital for Sick Children, Great Ormond-street; and an all-day course in Medicine, Surgery, and the Specialties, with special reference to tuberculosis, at the Queen Mary's Hospital, Stratford. Courses in June will be as follows: Gynæcology, at Chelsea Hospital for Women (June 16th to 28th); Dermatology, at the Blackfriars Skin Hospital (16th to 28th, afternoons); Medicine and Surgery, at the Prince of Wales's Hospital (16th to 28th, all day); Proctology, at St. Mark's Hospital (June 30th to July 5th, all day). Copies of all syllabuses and particulars of post-graduate work are obtainable from the Secretary of the Fellowship at 1, Wimpole-street, London, W.1.

Annotations.

"Ne quid nimis."

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH.

THE Royal College of Physicians of Edinburgh was founded in 1681, and it has been decided to celebrate the 250th anniversary of its foundation on St. Andrew's Day, Nov. 30th, 1931. An attempt to incorporate the practitioners of medicine in Scotland for the purpose of raising the standard "both of the character and acquirements of physicians" originated in 1617, when application was made to King James I. of England and VI. of Scotland for that purpose. The King issued an order to Parliament for the establishment of a college to fulfil the design indicated, but political and religious dissensions prevented the scheme from being carried out. A further attempt was made in 1630, when King Charles I. referred the matter to the Privy Council, but the unsettled state of the country again delayed the project. With Cromwell in power accomplishment took a stride further, for the Protector took up the matter warmly, and a patent was made out in 1656 instituting a College of Physicians of Edinburgh. The patent, however, gave powers to the proposed college, which did not meet with general acceptance among doctors, and Cromwell's death put a stop for a time to the proposals. Eventually a charter of incorporation was obtained, chiefly through the exertions of Sir Robert Sibbald and the Earl of Perth, and the Great Seal was appended to the Charter on St. Andrew's Day, 1681, when King Charles II. was on the throne. The first president of the College was Archibald Stevensone. Owing to the destruction of the early minutes of the College the exact scene of the original meetings of the corporation is in doubt, though it may have been the house of Sir Robert Sibbald, the virtual founder of the College and its President in 1684. In 1698 the College resolved to purchase a house, but the members continued to meet in apartments rented for the purpose until 1704. In this year a property was bought in Fountain Close, and seven years later some adjacent land was added, by which time, we learn from contemporary writing, "the grounds and the shrubbery were the envy of the neighbouring Peers, to several of whom the privilege at their request was granted to walk in them as a favour." The buildings erected, however, were not worthy of their environment, and plans for their improvement did not find favour, so that a request was made by the College to the Royal Infirmary for permission to hold meetings at the institution, as well as shelter for the books which were suffering injury. For 15 years the College enjoyed the hospitality of the Infirmary with whose origins it was closely concerned, and the premises in Fountain Court were sold in 1770 for £800. A College Hall was commenced in George Street in 1775, when the foundation-stone was laid by the famous William Cullen, the President. The present hall, designed by Thomas Hamilton, dates from 1844, the adjoining premises having been added at different times. The story of the College, especially in its various connexions with the Royal Infirmary, illustrates the progress of academic and clinical medicine in Edinburgh from the union of the two kingdoms, and there is no need to point to the fact that the science of the senior partner has been repeatedly reinforced from Scotland.

THE SILICOSIS BILL.

THE objects of the Workmen's Compensation (Silicosis) Bill, which has now been read a third time in the House of Lords, are first to bring cases of asbestosis within the scope of Section 47 of the Workmen's Compensation Act, 1925, and secondly to give powers to the Secretary of State to make a general scheme for all the industries to which compensation schemes apply, in order that the medical arrangements may be orderly and efficient. At present such cases are reported by certifying surgeons with medical referees to fall back on in case of disagreement; examination by a medical board, devoting itself entirely to this type of case, will no doubt replace this system. Amendments brought forward by Viscount Brentford at the committee stage of the Bill to each of these proposals were rejected. In the first place, it was suggested that the amount and severity of asbestosis did not warrant its inclusion in the schedule, and that if included there would be an increasing number of claims, many of them without justification. In reply, Earl Russell showed that although the number of workers in asbestos was not large, yet the incidence of disease in them was considerable; more careful and skilled examination of the workers would, he suggested, unmask the presence of asbestosis which had previously been mistaken for some other pulmonary disease. Lord Brentford also expressed anxiety lest the scheme for coördinating medical arrangements should involve a large staff and expenses, of which the major part would fall on the employers who already made their contribution through the national health insurance system. Earl Russell was able to assure him that the Treasury would make an annual contribution to medical expenses, while the national Exchequer would be relieved of the present expense of appeals from the certifying surgeon. Furthermore, existing medical boards for the various silicosis industries would be the basis of the new medical service, and would no doubt be able to cope with the extra work with the addition of one or two new centres. The amendment was not pressed on the understanding that the scheme should be prepared in consultation with the employers' federation.

CERVICITIS AND BACKACHE.

OF the disabilities that cause a person to seek medical aid, backache is one of the most common. The symptoms vary from a heavy dragging sensation which makes life burdensome to an acute stabbing, crippling pain which makes any form of work impossible. The causes of backache are legion; Prof. J. P. Maxwell,[1] of Peking, has recently added to the long list by suggesting that a mild form of osteomalacia might be responsible for some of the cases in this country. The treatment of the condition is usually empirical, and ranges from a mustard plaster or some linament through belts, extraction of teeth, dietetics and diathermy, and manipulation to a severe surgical operation. All these procedures are praised by their several exponents, but none has received general favour. Dr. James Young[2] has recently restated and emphasised the view that chronic cervicitis is responsible not only for leucorrhœa, but also for abdominal and pelvic pain, bladder and menstrual troubles, and marked and varied disturbances of the general health. Indeed, he goes so far as to say that, with the possible exception of prolapsus uteri, chronic cervicitis is the commonest gynæcological cause of abdominal and pelvic pain, and advises dilatation of the cervix and the cautery in its treatment. Dr. Harold Baker,[3] writing on the same subject in America a few weeks later, while guardedly stating that these symptoms had been attributed to cervicitis, claims that the leucorrhœa may be cured by cautery without dilating the cervix and without any anæsthetic, "since patients experience very little discomfort or pain." That gonorrhœal cervicitis should be promptly and energetically treated, and that gonorrhœal arthritis may be rapidly relieved by treating the cervix, nobody will deny, but that the symptoms suggested by Dr. Young are actually

[1] Proc. Roy. Soc. Med., March, 1930, p. 639.
[2] See THE LANCET, March 15th, p. 575.
[3] Amer. Jour. Obst. and Gyn., April, 1930, p. 548.

caused by, not merely associated with, cervicitis is difficult to believe. The cervix is practically insensitive, and large numbers of women suffering from leucorrhœa complain neither of abdominal nor of pelvic pain. All authorities are agreed that the condition is more common in women who have borne children, and that it is associated with constipation, anæmia, and general ill-health. It is equally well known that women who are run down from any cause, social or industrial, suffer from menstrual disorders and leucorrhœa, and that these symptoms disappear when the general health improves. Many authorities hold that a loaded colon is the commonest cause of the symptoms attributed by Dr. Young to cervicitis. At one gynæcological clinic which has a large out-patient department no woman is examined per vaginam until she has taken a mixture containing iron and magnesium sulphate for at least a week. The result of this routine is that 70 per cent. of women are cured without further treatment. The very varied opinions on the subject are not a credit to gynæcology.

THE CARNEGIE TRUST AT HOME.

THE programme of the Carnegie United Kingdom Trust during the years 1931 to 1935 is to include an increase of children's play centres, development of a better service of public libraries and public baths, and a more comprehensive policy in the field of adult education.

The sixteenth annual report gives an interesting survey of the success of the playing-field movement as a result of the propaganda begun in 1927. The grants made have been comparatively small, varying from one-tenth to one-sixth of the total cost in each case, but in spite of this local authorities have proved anxious to undertake and carry through schemes for the provision of playing-fields in their areas; only two or three grants have been refused out of a total of 260 offered during the years 1928 and 1929. In the distressed mining areas special grants have been made towards playing-fields, with a twofold purpose: to provide the unemployed miners and their children with opportunities for enjoying fresh air and exercise, and to offer employment to some of the men in the construction of the fields. In many places where fields have been provided under the scheme there is evidence that the demand is in excess of the accommodation, and the authorities are considering extension of their present areas. One of the dangers experienced during the last few years has been deterioration owing to lack of adequate maintenance and supervision. Turf, fencing, and equipment suffer quickly from neglect, and if the playing-fields are to fulfil their function constant care and restoration are necessary. In Scotland a committee has been formed to supervise the spread of the movement, which has hitherto been slower than in England. The demand for play centres for young children has been considerably stimulated by the playing-field movement, and grants are made for equipment, such as swings and see-saws, and for sanitary accommodation and shelters. The value of such play centres in crowded districts can hardly be over-estimated; the danger of death or disablement from accident increases yearly where children have no playground but the streets. Another of the activities of the Trust has been to provide shower bath installations in a small number of selected villages in Lincolnshire. These have been much appreciated, and it is hoped that they will shortly begin to pay their way. The Lindsay Education Authority are making a grant to enable school-children to attend without charge. The model child welfare centres established in various towns during past years are now all recognised as essential parts of the municipal health services. The work is steadily developing. The Rhondda Centre, built in 1927 but not opened for financial reasons, has at last been equipped, and was to begin work in April, 1930.

The new social survey of London, to which the Trust has promised a grant of £1000 when other contributions shall have reached £14,000, has now £12,200 available and will presumably secure the remainder shortly. The survey is to cover poverty, housing, industry, and special subjects. Poverty has been the subject of conferences between school attendance officers, employment exchanges, boards of guardians, police, house and estate agents, and the Charity Organisation Society. Information on housing is being supplied by the various boroughs, and the industrial survey is in the hands of appropriate experts. Special subjects will include, among others, the influx and efflux of population, the social influence of trade-unions, dwellers in neighbouring garden cities, and habits of leisure in the city of Westminster.

THE TRAGEDY WITH BCG VACCINE AT LÜBECK.

OUR Berlin correspondent tells us of the disastrous sequel to the use of BCG vaccine which has been reported from the Hanseatic city of Lübeck. It appears that the Calmette method of protecting infants against tuberculosis has lately been brought to the notice of the Berlin Medical Society and the German Central Tuberculosis Committee, and Prof. His had invited Dr. Weill-Hallé, of Paris, to initiate a discussion at the Charité Hospital in Berlin. In Düsseldorf Prof. Schlossmann nad already reported favourably, and experience at the Children's Hospital at Berlin was similar. At Lübeck, however, it has been otherwise. There the vaccine was employed on the official recommendation of the local health authority and 246 infants were treated on the lines indicated by Calmette. Of these 50 became severely ill with swelling of the inguinal and abdominal glands and other symptoms of acute tuberculosis. Fourteen deaths have been reported and others are expected to follow. Prof. Lange has been sent by the German Health Office to inquire into the cause of the disaster, which has not yet been ascertained. It seems clear that the original culture was purchased in Paris, further subcultures being made in Lübeck by Dr. Deycke, an experienced immunologist, who is confident that no mistake can have been made either in the preparation or in the distribution of the remedy at Lübeck. Local criticism is directed to the fact that the method was applied outside the hospitals and dispensaries and that midwives were instructed to give the vaccine to newly born infants (their parents being agreeable) not under immediate medical control. Prof. Guérin, of the Pasteur Institute in Paris, has however, declared that the vaccine of which a quantity was sent to Lübeck in the autumn of last year was in good condition and that a mistake must have been committed in its application. It was as usual sent in bulk for subculture on the spot, as the ampoules do not travel. BCG, it may be recalled, is a bovine strain of tubercle bacillus, first isolated in 1906, and repeatedly subcultured for 13 years on a special medium of glycerinated ox-bile until its virulence was reduced to a point regarded as safe for inoculation work with living cultures. But although Calmette and his collaborators claim absolute proof of safety on an experience of 400,000 injections, laboratory workers have not all felt happy about the avirulence of the material. Two years ago at the Trudeau sanatorium S. A. Petroff and Arnold Branch found that the vaccine was not constantly innocuous to small laboratory animals. In two instances generalised tuberculosis followed direct inoculation into guinea-pigs and in a further instance tuberculosis was established after the second animal passage. When the vaccine was cultured in a fluid medium the appearance of two types of colonies made the Trudeau workers suspicious of the existence of variants similar to those observed in the reproduction of other acid-fast organisms; and after plating they were able to differentiate two distinct types of

colonies, one of which produced tuberculosis which in time healed, while the other produced progressive disease terminating in the death of the guinea-pig. Petroff's work was confirmed last year in the New York public health laboratories by M. J. King and W. H. Park, although the Pasteur Institute, using his technique, failed to obtain virulent bacilli either by culture or passage. Whatever may be the truth about the immunising value of B C G vaccine—Dr. Stanley Griffith is engaged on investigating it at the Cambridge field laboratories—the Lübeck incident brings to mind the all too obvious fact that the use of live vaccines has its dangers and limitations. It was long believed that the use of living but attenuated virus was essential to the production of a good prophylactic immunity, but as Prof. J. McIntosh pointed out in a presidential address four years ago[1] this belief broke down after the experience of Haffkine with his plague vaccine and Wright with his typhoid vaccine; since then the general trend of medical progress has been to drop the use of living virus for the dead virus or for some of its products. The injection of virus capable of multiplication in the injected body is far from ideal, for when multiplication occurs there is no possibility of estimating the dose to which the patient has been subjected, and in susceptible individuals this may lead to unforeseen results. The reintroduction of the use of an attenuated living virus in tuberculosis was described by Prof. McIntosh as a retrograde step. Who knows, he said, for how long an attenuated bacillus can lie dormant and then assume its former virulence?

SOCIETY FOR RELIEF OF WIDOWS AND ORPHANS OF MEDICAL MEN.

AT the annual general meeting of this Society, held on Wednesday, with the President, Mr. V. Warren Low, occupying the chair, the report for 1929 was presented. Five members have died, six resigned, and six new members were elected during the past year, making a total membership of 284, made up of one honorary, 162 life, and 121 ordinary members. At the end of the year there were 49 widows and 12 orphans in receipt of grants; during the year four widows and seven orphans came on the funds and four widows died. The benefits offered by membership are well illustrated by the grants received by these four widows.

One came on the funds in 1904, her husband paid in subscriptions £31 10*s*. and his widow received in grants £2200. Another who came on the funds in 1918 received in grants £750, her husband having paid £52 10*s*. Another came on the funds in 1915 and received £1050, her husband having paid £35 14*s*., and the last widow who came on the funds in 1925 received £300, her husband having paid £31 10*s*.

The invested funds of the Society amount to £140,700. The income received from investments was £4244, income-tax returned £764, interest on deposit account £51; £255 was received from subscriptions, and donations amounted to £108. One legacy was received of £140. £5252 10*s*. was distributed in grants, and working expenses were £330.

The smallness of the membership is a matter of concern to the directors, and they desire to bring to the notice of the newly qualified and also the newly married members of the medical profession the advantages that may be gained by joining the Society, which is both provident and benevolent. Should a member die and leave his widow with an income not exceeding £125 per annum, she would, on the present scale, receive from the Society a yearly grant of between £75 and £90, and any children under the age of 16 would receive a yearly grant of £60 each. Over the age of 16 special grants may be made to orphans to enable them to continue their education or start in some profession. These grants in many cases amount to £52 10*s*. a year to each orphan. The amount of the annual subscription is small compared with the benefits that may derived by unprovided dependents of a deceased member. For a member who at the time of his election is under 40 years of age it is two guineas; there are special terms for life membership. Relief is granted to the necessitous widows and orphans of deceased members of three years' standing, and of life members. Membership is open to any registered medical practitioner who at the time of his election is resident within a 20-mile radius of Charing Cross. Particulars may be obtained from the secretary of the Society at 11, Chandos-street, London, W.1.

[1] THE LANCET, 1926, ii., 889.

RESEARCH FELLOWSHIPS IN TUBERCULOSIS.

FELLOWSHIPS for research in tuberculosis are being provided from a fund established in memory of Dorothy Temple Cross, and the first award will be made by the Medical Research Council in July for the academic year beginning on Oct. 1st. The object of the Fellowships, as defined in the trust deed, is to give special opportunities for study and research to persons "intending to devote themselves to the advancement by teaching or research of curative or preventive treatment of tuberculosis in all or any of its forms." Candidates must be British subjects and must hold suitable medical, veterinary, or scientific qualifications. They must also be able to produce evidence of their ability to make good use of the opportunities offered. The Fellowships will preferably be awarded to candidates who wish to conduct their studies or inquiries outside Great Britain. They will, as a rule, be awarded for one year, but in special cases may be renewed. Their value will depend upon the standing and qualifications of the candidate, but will not be less than £300 per annum, with travelling expenses in addition. It is also hoped to award one senior Fellowship of considerably greater value, and with good prospect of renewal for a further period, to a well-qualified candidate wishing to undertake intensive investigation into some special problem of tuberculosis whether under a temperate or a tropical climate. Application must be made not later than June 30th, and further particulars are obtainable from the Secretary of the Medical Research Council, 38, Old Queen-street, London, S.W.1.

A SCHOOLBOY'S SUICIDE.

TWO letters have recently appeared in the press the relation between which is not obvious at first sight. In the one Sir Farquhar Buzzard pleaded for the treatment of the sufferer from "nerves," a minor mental disorder for which treatment is not readily available. In the other the father of a boy who had committed suicide repudiated the suggestion that the lad was a coward. The need for this plea arose from an assumption that the cause of suicide was fear of fagging at school, and the headmaster of the school was likewise compelled to defend himself from the emotional storm aroused by the publicity given to that assumption. The storm was connected with an old controversy about fagging at public schools that need not concern us here; the belief that any boy could have a direct and rational fear of the discipline of present-day fagging so great as to lead to suicide is closely related to the neglect of minor mental disorders which prompted the letter of Sir Farquhar Buzzard. Doubtful points concerning physical disease are in little danger of neglect at inquests; expert assistance is promptly called for, especially if responsibility, direct or indirect, is likely to be fixed upon anyone. But in the much more difficult problems of behaviour the psychologist is seldom asked for an opinion.

In its characteristics this case does not stand alone. Suicides that are apparently inexplicable are common, and sometimes the victim's friends describe his over-conscientiousness, his devotion to work and duty, his

earnest and scrupulous regard for others—qualities estimable in their proper place, but in these cases recognisable as indications of one type of "nervous" disorder and suggesting to the psychopathologist other and deeper emotional stresses. This boy was described as capable, hard-working, and brave, the only evidence of emotional stress being a casual observation that he was subject to notable phases of silence. It is possible that the matter of fagging served as a point of fixation of troubles dependent upon deeper emotional difficulties, just as in the other cases we hear that the victim persistently worried over matters that others regarded as trivial or non-existent. It is the essence of some disorders that the patient suffers from anxiety of unconscious origin; this anxiety must be transferred to something in the world outside, and it may then appear as irrational and absurd. Perhaps the day will come when we shall be able to recognise temperamental difficulties in young people and give timely aid, just as we have already learnt to watch over the physical well-being of the child without waiting for the development of disease.

INFECTION IN ST. KILDA.

A ST. KILDA lies 40 miles west of Northern Uist, and is the most isolated of the British Isles. This spring the relief ship sent out by the Scottish Health Department only effected a landing with difficulty at the second attempt, and in former times the island was regarded as almost inaccessible during eight months of the year. These circumstances have long deserved the attention of epidemiologists, and the name of St. Kilda has, in fact, become familiar to the profession in more than one connexion. It is well known, for instance, that formerly more than half the children born on the island died of tetanus neonatorum—a state of affairs which lasted as late as 1890, when Nurse Chisnell began her ministrations. This peculiar mortality had been variously explained before its cause was discovered, and there have been at least as many explanations of the strange way in which the St. Kildeans take cold on the arrival of the first boat of the season. In his "Life of Johnson," Boswell relates that when Macaulay wrote his account of the island, "he was advised to leave out of his book the wonderful story that upon the approach of a stranger all the inhabitants catch cold." To which Johnson replied, "Sir, to leave things out of a book, merely because people tell you they will not be believed, is meanness." Dr. John Campbell, it appears, took a great deal of pains to ascertain the facts, and attempted to account for them "on physical principles, from the effect of effluvia from human bodies." But a lady of Norfolk wrote to Boswell to say that the "explication of this seeming mystery" was so very obvious as to have escaped attention.

> "Reading the book," she said, "with my ingenious friend, the late Reverend Mr. Christian of Docking—after ruminating a little, The cause, (says he,) is a natural one. The situation of St. Kilda renders a north-east wind indispensably necessary before a stranger can land; the wind, not the stranger, occasions an epidemick cold."

As in the time of Mr. Christian, the need of epidemiology to-day is for accurate data, and St. Kilda might still provide some. A few years ago almost every inhabitant took whooping-cough, but unfortunately this incidence of infection on the virgin soil of an adult population could not be studied as it deserved. The opportunity for medical research on the island still exists, but it is rapidly passing. The native population—109 in 1852—is now only 38, to whom should be added the missionary and his family, and the nurse provided by the Highlands and Islands Medical Service. Attempts have often been made to get the inhabitants to leave their home, for it has not fully supported them within living memory. Soon, moreover, there may not be enough men to take boats across to the neighbouring islands where they keep sheep. The captain of the relief trawler says that all save two old men would now be willing to leave, but our Scottish correspondent thinks this is "too good to be true." It does not allow, he says, for the nostalgia of the islander, and he doubts whether the maintenance of the remnant would be any less expensive on the mainland. Meanwhile we learn that a geologist lately spent a long period in verifying the structure of the island, and it seems likely that a medical research student of suitable gifts could make something equally important out of its unusual human material.

INSULIN BY NOSE AND MOUTH.

MANY attempts have been made to devise means of administering insulin which will be free from the inconvenience of daily hypodermic injections. Recently H. Wassermeyer and A. Schäfer[1] have recorded observations on absorption of the hormone from the nasal mucous membrane, when applied either on tampons or in the form of snuff. They find definite evidence that some degree of absorption occurs, the blood-sugar—both in the diabetic and in the normal subject—falling appreciably during three hours following the application. Unfortunately, the fall in the blood-sugar is not proportional to the dose of insulin employed. 100 units have no greater effect than 20 units, and it is apparently impossible to reduce the blood-sugar sufficiently to evoke hypoglycæmic symptoms.

Since the successful management of diabetes entails a nice adaptation of the dose of insulin to the varying tolerance of the patient, and since any chance catarrhal inflammation of the absorbing surface must adversely influence absorption, it is evident that the scope of intranasal insulin therapy is severely limited. Another and more ambitious attempt to solve the same problem has been even less successful. It has been claimed that insulin, when mixed with desoxycholin, is rendered immune to the destructive action of the digestive ferments and can thus be administered by the mouth. D. Kwilecki and K. Silberstein,[2] however, have failed to find any evidence that this preparation (Cholosulin) is of value in diabetes, and they observed dyspeptic symptoms in several patients to whom it was given. Cholosulin, even in such heroic doses as 200 units, does not depress the fasting blood-sugar. If it is given several hours before a meal it certainly tends to lessen the subsequent rise in blood-sugar, but this may well be due to the nausea which it undoubtedly provokes.

The hypodermic syringe remains indispensable to the diabetic requiring insulin.

A CONGRESS OF PUBLIC HEALTH.

Major-General J. E. B. Seely, as Lord Lieutenant of Hampshire, will preside over the annual congress of the Royal Institute of Public Health which meets at Portsmouth at Whitsuntide. After an inaugural session on the morning of Wednesday, June 4th, at which he will give an address on Health and Courage, the congress will adjourn until the following day, when the sectional meetings begin at the Guildhall. The two principal discussions in the Section of State Medicine will be on National Health and the Local Government Act, and on the Slum Problem. Prof. H. R. Kenwood's presidential address will be on the Reduction of Preventable Disease, and among the papers contributed will be one by Dr. C. O. Stallybrass on Variations in Virulence during the Course of Epidemics. Prof. René Cruchet, of Bordeaux, will address the Services Section on Post-encephalitic Parkinsonism and Military Pensions, and Dr. J. B. Christopherson will speak on the Rôle of Dress in the Tropics in Relation to Health and Disease. The chief subjects before the Section of Industrial Hygiene—as is suitable for a Portsmouth meeting—are Health in Seafaring Occupations and the Health of Dockyard Workers; while the section

[1] Med. Klin., March 28th, p. 474.
[2] Ibid., April 4th, p. 513.

concerned with women and children will have discussions on the Slum Child, and on the Prevention of Sickness and Death in Motherhood. Before this section Dr. Doris Odlum will speak on Home and the Adolescent, Mr. W. Clarke Hall on the Problem of the Delinquent Child, and Lieut.-Colonel R. Kuper White on Post-puerperal Disabilities in Women. Sir Henry Gauvain's presidential address to the Section of Tuberculosis will deal with Sun Treatment in England, and Mr. H. Morriston Davies will open a discussion on the Present Position of Surgical Treatment of Pulmonary Tuberculosis.

Each of the sections has arranged visits to centres of interest in the locality, and there are, as usual, various excursions and functions for the congress as a whole. Application for membership may be made to the hon. secretaries of the Institute, 37, Russell-square, London, W.C.1.

MENTAL HYGIENE IN PUBLIC HEALTH.

A NEW conception of preventive medicine and public health work was outlined by Prof. Haven Emerson in his address to the First International Congress on Mental Hygiene held in Washington early this month. He spoke of mental hygiene as a public health problem and gave convincing arguments in support of his thesis that the public health service in its present form is inadequate to the needs of the community. The control of communicable diseases, the protection of maternity and infancy, the detection of physical defects or even of feeble-mindedness in children, and so forth, can no longer be considered the whole duty of the health officer. In the future he may be called upon to account to his constituency for the incidence of suicides, showing correlations perhaps with unemployment, the prevalence of divorce, heredity, sex, and occupation. The fact that the diabetes death-rate in America has risen in the last 70 years from approximately 5 to 20 per hundred thousand is important enough but is of less real moment to the community than that the suicide-rate has risen in the same proportion. It is questionable, he continued, whether investigation of the reasons for a rising death-rate from appendicitis is any more necessary than the analysis, with a view to prevention, of the conditions which have brought about a rise in the divorce-rate from 26 to 68 per hundred thousand in less than 50 years. He did not minimise the importance of diphtheria swabs and typhoid inoculations, but urged that the psychological welfare of the community should also receive attention. According to experienced child-guidance workers, in any unselected group of children of four years of age, considered by their parents to be normal, more than one-third are found on investigation to have characteristic behaviour problems which are likely to develop into personal or family embarrassments. It is not a matter of intelligence, to be dismissed as a problem that the proper ascertainment of defectives would solve. These ill-adjusted children are found among the dull, the average, and the precocious. Evidence of deviation from good mental health may include extreme shyness, severe speech defects, and the more precise phenomena of tantrums, interference with appetite for and use of food, and enuresis. The problem of public health, according to Prof. Emerson, is to include in the plan of service to parents such personnel as can be trusted to notice aberrations of conduct in the home, to advise parents to seek professional guidance when necessary, and to deal with early and mild disturbances in this field in the same way as health visitors deal with physiological errors in the field of growth, nutrition, and infection. The community should see that the psychiatrist gets to the mean lazy ne'er-do-well before the policeman does, and that the bully, the fearful child, and the miserable man meets a wise social worker before he is forced into an institution.

This stimulating address was a fitting introduction to the deliberations of a congress so important that 53 countries were represented and so interesting to the American people that an audience of over 3000 persons attended the inaugural session. Some of the scientific communications made to the congress were reported in THE LANCET of last week, and another group will be found on p. 1148. The history of the mental hygiene movement, from its inception in 1908, has been one of almost miraculously rapid development. The source of the movement, as Dr. William White pointed out in his presidential address, was the vision and zeal of one man. When he was a student at Yale, Mr. Clifford Beers had a mental breakdown from which he completely recovered. He returned to the community inspired with the purpose of saving others from the sufferings which he himself had undergone and the first committee on mental hygiene was formed in Connecticut with the single object of improving the conditions in mental hospitals. The growth of the organisation was speedy, accelerated by the strong public opinion created by Mr. Beer's book "A Mind that Found Itself," and the concept of definite curative treatment of the insane and of the prevention of insanity began to take shape. It was soon felt that this aim, valuable as it was, constituted only one aspect of mental hygiene, what might be termed the negative aspect. The positive aspect—the guidance of children, adolescents, and employees, which involves the education of parents, teachers, and employers to the knowledge that abnormalities of behaviour at all ages are influenced less by reason than by emotional undercurrents, is even more important. The communications to the congress show how much progress has already been made by Americans and how generous has been their endeavour to stimulate action in other countries. Partly through the good offices of the Commonwealth Fund, London is now equipped with at least three child-guidance clinics and more will come. The spirit of a few enthusiasts has flamed so brightly that it has compelled the attention of the whole world.

RETIREMENT OF MR. HAYWARD PINCH.

THE retirement of Mr. A. E. Hayward Pinch, F.R.C.S., after 21 years' work as medical superintendent and director of the Radium Institute, is announced to take place in June next. The reorganisation of the work of the institute, consequent on its affiliation with the Mount Vernon Hospital, and the setting up of the new Post-Graduate School of Radiotherapy, is in progress, and Mr. Pinch's state of health prevents him from undertaking new and more onerous duties. The committee of the Radium Institute, in announcing Mr. Pinch's impending retirement, put on record their appreciation of the service he has given during his long tenure of office, and have elected him a member of the honorary consulting staff.

THE sixth annual meeting of the National Institute for the Deaf will be held at Church House, Westminster, on Friday next, May 30th, at 3 P.M. Lord Charnwood, the President of the Institute, will preside, and Mr. Stanley Baldwin will address the meeting.

ROYAL INSTITUTION.—The Rockefeller Foundation has offered £20,000 for endowment of research in the Davy-Faraday Laboratory on condition that £50,000 is raised from other sources. This offer has been accepted.

JUVENILE BLINDNESS IN SCOTLAND.—Mr. William Adamson, the Secretary for Scotland, recently opened large extensions of the workshops of the Aberdeen Asylum for the Blind, which have cost close upon £5000. Mr. Adamson pointed out that the statistics warranted the hope that the newly born blind would shortly entirely disappear in Scotland. They have already done so in the north-east of Scotland, there no longer being a single blind child under 6 years of age in the county or city of Aberdeen, or in the counties of Banff and Kincardine.

The Clinical Interpretation of Aids to Diagnosis.

A Series of Special Articles Contributed by Invitation.

LXXIII.

THE SIGNIFICANCE OF IDIOPATHIC SKIN REACTIONS.

PART I.*

SKIN reactions in cases of inherited or idiopathic sensitisations have had too much medicinal virtue ascribed to them; in their clinical use they have almost developed into one of the pathological rituals designed towards magical healing. On the other hand, when sensitisation acquired through infection is in question—e.g., the von Pirquet or the Dick test—they are used too capriciously, no doubt because some coördinating pathological principle is lacking. The two types of reaction are quite distinct.

We have on the one hand the skin reactions which fall into line with the histamine reactions described by Sir Thomas Lewis—reactions taking 7 minutes to begin and about 20 minutes to finish. Typical of these is the effect of grass pollen on the skin of the hay-fever subject. On the other hand, we have a rather heterogeneous collection of reactions coming up in different times, sometimes showing best after three hours, sometimes best after 24 and lasting for an indefinite period; these group themselves round the old tuberculin reaction and may perhaps be typified by the von Pirquet. The first group are hereditary or idiopathic (the toxic idiopathies), the second are the result of some change in our circulating blood and fixed cells due to infection. It is true that these differences may be only apparent, since the *tendency* to tuberculosis, for example, is itself hereditary and presumably idiopathic, and no one knows how the hereditary tendency towards hay-fever develops into the actual disease.

In current parlance, "skin reactions" usually betoken tests in the first or idiopathic group, and it is with these that I propose to deal in this article, starting by describing as typical the hay-fever reaction. What is here said of hay-fever is applicable to all the others—horse asthma, egg sickness, bacterial sensitisation, and the rest.

Hay-fever Reaction.

In this asthma group of diseases there is a tiresome muddle in nomenclature. Some are named by the protein irritant which produces them, e.g., *hay*-fever, *horse*-asthma; others are named by the most prominent symptoms these irritants produce, e.g., asthma, urticaria; others again are named from the neural mechanism involved, e.g., *vasomotor* rhinitis, "reflex" asthma, and so forth. In each case the sponsor gave the name according to the part of the pathological mechanism which most impressed him; the terms, therefore, are not mutually exclusive and it is necessary to emphasise that the term "hay-fever" is *not* a popular synonym for rhinorrhœa, vasomotor rhinitis, conjunctivitis, or laryngitis, though it frequently gives rise to these symptoms. Hay-fever is the reaction which takes place when grass pollen comes in contact with people with an idiopathic sensitiveness to it. In bringing a minimal quantity of grass pollen into contact with a selected area of such an individual we are producing a miniature attack of hay-fever; if the selected area is visible we can see the attack and can thus make it diagnostic of the spontaneously occurring disease. This in practice confines our experimental area to the surface of the body, but it is important to keep clearly in mind that grass pollen works out of sight also. If sniffed up the nostrils of hay-fever patients it provokes a rhinorrhœa (Blackley); if injected up the rectum it provokes pruritus and tenesmus (Dunbar); if swallowed it provokes nausea, vomiting, and even diarrhœa; and if it gains access to the blood stream it may provoke any of the symptoms of the toxic idiopathies—asthma, rhinorrhœa, urticaria of any intensity up to angioneurotic œdema, eczema, migraine, epilepsy, functional albuminuria, &c. As has been said above, the grass pollen reactions are typical of what may be done by any of the other protein irritants; therefore any skin test showing a protein sensitisation may throw diagnostic light on any of the above-mentioned disorders.

A diagnostic reaction with grass pollen may be carried out by bringing it, or an extract of it, into contact with the living tissues of the sensitive person on some area of the body where we can observe the result. In practice four different methods can be used.

Injection into Conjunctival Sac.

Pollen (or preferably, a very dilute extract of pollen) may be dropped into the conjunctival sac of the eyeball; this area is perhaps the most sensitive in reacting. In a positive reaction the patient notices a tickling in the eye, and he may perhaps sneeze owing to an overflow of the extract down the lacrymal duct and so into the nasal cavity. In about seven minutes from the instillation of the pollen, the eye will be seen to be more watery than its fellow of the opposite side, the blood-vessels will become more noticeable, especially towards the inner canthus, and the caruncle will become slightly pinker. In a minimal reaction such as this the effects should be lessening in 15 minutes, and should have disappeared in from 20 to 25 minutes. With stronger extracts more definite changes are observed and they last longer; the whole eyeball gets bloodshot, the irritation becomes really distressing, and the effect may last for hours; presumably, if sufficient pollen substance were added to a sensitive enough case the conjunctiva would blister, and flake off as may happen in severe cases of the naturally occurring disease. It is therefore expedient in a new case to begin with a very weak dilution indeed, and gradually to increase the strength until a minimal reaction is obtained. The strongest extract will give no reaction on the normal man, but in the hay-fever subject the intensity of the reaction will depend on the extent of the pollen sensitiveness of the individual. In other words, the more sensitive the individual the weaker must be the extract which gives just a minimal reaction. It is thus possible not only to make a sure diagnosis of pollen sensitiveness but to gauge the intensity of the sensitisation by noting what strength of pollen extract will cause a minimal reaction. The most sensitive case I have ever tested reacted with one drop of 1:330,000 extract of *Phleum pratense* pollen, which would represent perhaps the extract from a sixth of a millionth of a gramme of the pollen. At the other end of the scale, if patients do not react to a drop of the 1:200 extract they will not react at all—i.e., they are not subject to hay-fever. This quantitive interpretation is not, of course, absolutely true, but it is true enough for therapeutic purposes with certain reservations. For example, the intensity of the reaction depends to some extent on the emotional state of the patient. A combative self-reliant person may, if sufficiently keyed up, diminish quite considerably the customary reaction, while an anxious emotional person may increase it (this may be a question of adrenalin in the circulation); but no emotion can produce a reaction in a non-hay-fever subject or can abolish it if a sufficiently strong extract is employed with the true hay-fever subject.

This eye method is a very delicate—perhaps the most delicate—test of sensitisation, but it suffers from two inherent defects: (1) that there is only

* Part II. will appear in our next issue.

one eye to test, since the other has to be kept as control; (2) it is not justifiable to take any risk with the eye either by instilling a normally noxious substance or by using too strong a reagent. Pollen causes such a strong reaction that very dilute extracts have to be used; but when a bland innocuous substance like cow's milk is suspected it is convenient sometimes to put a drop into the conjunctival sac for diagnosis.

Application to the Lips.

If grass pollen is applied to the lips of a hay-fever subject a feeling of burning or pepperiness will be experienced in a few minutes, and the lips will swell, become inflamed, and show blisters—the subjective and objective intensity of these phenomena varying with the sensitiveness of the person tested, and with the strength of pollen extract employed. In practice, this is not a very convenient method of testing; it is mentioned here only because it may be accidentally applied by nurse or mother to the newly-weaned child, when they try to force on it some new food to which it is sensitive. To quote a mother's story: "The baby fought and screamed for half an hour while we tried to get some egg into his mouth; then we noticed that his lips were all inflamed and swollen and covered with blisters; we stopped, supposing that he was fighting because his lips were sore. A week later, having first noted that his lips were all right, we saw them swell up after contact with the eggy spoon."

Intradermal Injections.

If pollen or pollen extract is brought into contact with the unbroken skin of a hay-fever subject usually no reaction occurs, though some very thin skinned women and children may get a little itching and inflammation. The reacting substance must penetrate the dead superficial layers of the skin to the living cells beneath, to the cutis vera, in fact, before the reaction can be produced. It may be rubbed in (thoroughly unsatisfactory); it may be put into an abrasion, scratch, or prick (the method in general clinical use); or it may be injected intradermally (the method mostly used for experimental work in the laboratory).

Whatever method may be employed to reach the cutis vera, when the protein irritant reaches sensitive living cells, in about seven minutes an itching will be experienced and the tested area will show a red patch; a little later this red patch will become an œdematous raised white weal. Simultaneously an erythematous blush will develop round the weal to a distance of from a quarter of an inch to an inch or two according to the intensity of the reaction. Meanwhile the weal may become more pronounced, with possibly a little drop of serous fluid exuding through the scratch, and if the reaction is at all intense the white raised area will spread laterally over an inch or more, often in curious pseudopodial projections as the œdema fluid tracks through the thickness of the skin along the lines of least resistance.

These phenomena reach their height in 10 or 15 minutes, and are usually noticeably fading away in 20 minutes. Such an intense reaction as this, with a dead white weal of irregular margin which could not be covered by half a crown, surrounded with an erythematous blush which could barely be covered by the hand, is a striking and unmistakable reaction which could be read at a distance of ten yards; but in practice many smaller or even minimal reactions occur, and the decision what is and what is not a reaction becomes important. It is necessary in fact to make a control test with an equal amount of scratching or rubbing-in, on a neighbouring site, using in place of the pollen (or whatever it may be) a neutral substance such as normal saline. No reaction can be accepted as positive unless there is an unmistakable difference between it and that on the control site. These precautions are the more necessary because dermographia tends to "run" in the family of sensitives. In fact, it may itself be classed as one of the toxic idiopathies.[1]

Testing by Proxy.

Lastly, the action of grass pollen on hay-fever subjects may be tested by proxy. If some blood is drawn from the vein of a hay-fever subject (1 or 2 c.cm. are ample) and allowed to clot, the serum can be injected into the thickness of the skin of a non-hay-fever man (e.g., the investigator); if this is skilfully done the skin can be well "mattressed" with the hay-fever serum over an area equal in size to a shilling or sixpence without any noticeable scarring, and the "mattressing" will quickly subside till in a day or two nothing is noticeable at the injected site (which therefore had better be outlined with indelible ink). If grass pollen is subsequently brought to this site, either by any of the methods described above or by injection into the vein of the investigator, then the site sensitised by the hay-fever serum, and only this site, will swell, giving the characteristic reaction; but if the pollen reaches the sensitised site diluted, via the blood, and not concentrated in a prick or scratch, it will give an œdematous reaction more approximating to angio-neurotic œdema, incidentally supplying a useful indication of how that condition may arise. Thus, a diagnosis can be made on serum sent through the post. A well-marked food sensitisation can sometimes be tested for in this way with striking results; all that the proxy has to do is to eat the suspected food.

JOHN FREEMAN, D.M., B.Ch. Oxf.,
Director of the Department of Clinical Bacteriology, St. Mary's Hospital.

The Services.

ROYAL ARMY MEDICAL CORPS.

THE undermentioned Lts. (on prob.) from the secd. list are restd. to the estabt.: J. E. Snow and E. G. C. Darke.

Lt. (on prob.) T. G. D. Coneys resigns his commn.

ARMY RESERVE OF OFFICERS.

Maj. C. L. Emmerson, R.A.M.C., to be Divl. Adjt., 55th (W. Lan.) Div., T.A., vice Maj. R. R. Evans, vacated.

Capt. F. R. How from 12th Lond. R., T.A. Res. of Off., to be Lt.

TERRITORIAL ARMY.

Lt. T. F. Arnott (late Cav. Res. Regts.) to be Lt.

[1] Freeman, John: Pathological Mechanism of the Asthma Syndrome, THE LANCET, 1928, i., 288.

WEST LONDON HOSPITAL.—Last year 3745 in-patients were received; there were 2232 major, and 4396 minor, operations, and 12,720 X ray plates were used.

ST. GEORGE'S HOSPITAL.—Presiding last week at the annual court of governors of St. George's Hospital, Prince George stated that unless an additional income of at least £20,000 could be assured the time would come when its activities would have to be curtailed. He added that last year some 6000 in-patients and 39,000 new out-patients were treated, and that 250 infants were born in the hospital.

HOSPITALS AND MOTOR ACCIDENTS.—Glasgow Royal Infirmary is publishing weekly figures of the number of motor accident cases treated. In the three weeks ended on May 10th the infirmary treated 76 such cases, 37 of which were admitted. During March the three Glasgow voluntary hospitals treated 222 motor accident patients, 31 of whom entered the wards.—Last year Leeds Infirmary dealt with 1135 motor cases, which cost £4307, and the amount paid was £167.—Blackpool Victoria Hospital treated 148 accident in-patients and 26 out-patients at a cost of £1062; £176 was recovered.

Special Articles.

SOME OBSERVATIONS ON THE AFTER-CARE OF TUBERCULOUS PERSONS.

By P. C. VARRIER-JONES, M.A. Camb., M.R.C.P. Lond.,

MEDICAL DIRECTOR, PAPWORTH VILLAGE SETTLEMENT, AND HON. MEDICAL DIRECTOR, ENHAM VILLAGE CENTRE; LECTURER ON TUBERCULOSIS, STATE MEDICINE SYNDICATE, UNIVERSITY OF CAMBRIDGE.

THE Minister of Health (Mr. Greenwood), in his speech in the House of Commons on April 29th, has again focused attention on the important problem of the after-care of the tuberculous person. He said: "With regard to tuberculosis, the experience of village settlements and the principles on which their successful working depended had been brought to the notice of certain local authorities where the conditions seemed favourable to the establishment and maintenance of similar settlements. Even if settlements were provided for all tuberculous patients for whom they would be appropriate there would still be a number of people for whom after-care would be required. He hoped that local authorities, as the next move in the campaign against tuberculosis, would consider and experiment in methods of after-care." Again, in opening the new sanatorium recently built by the Essex County Council, he used the following words: "Sanatoriums could not provide assistance of a permanent nature, as patients, on leaving them, returned to unfavourable conditions. It seemed a little short-sighted for money to be devoted to the building and maintenance of sanatoriums when next to nothing was done to provide proper after-care treatment. He hoped that attention would be given to this problem."

While these official pronouncements are sufficiently important to warrant attention, they are by no means new to those of us who are daily working at the problem. Indeed, the problem is forced upon the attention of all those who in any way are in touch with the tuberculous population, whether at the dispensary or the sanatorium. The private practitioner has to face the difficulties of the situation in his daily work and especially the most serious aspect of the problem. Thus, when he has diagnosed pulmonary tuberculosis and succeeded in having the patient recommended for sanatorium treatment, the position is for a time relieved, but later, although the good results of this treatment are obvious, the patient returns home—to a house as unsuitable as it can be for any form of treatment, and the practitioner feels grave anxiety about the future, in spite of the assistance of the local tuberculosis officer and the palliative measures then put into force. Visits to the dispensary take place at regular intervals, reports are written at stated times—but the patient goes downhill, and the conditions at home go from bad to worse. Can the patient be readmitted to a sanatorium? Sometimes this question is answered in the affirmative—sometimes not. If he is readmitted there is a spell of comparative ease—the great burden on the family is for the moment relieved, but when the patient returns home once more the whole dismal story is repeated. The position of both the patient and the family becomes acute.

Further, a powerful deterrent in preventing the early case from accepting treatment is the fact that, if it were known that he had had treatment in such and such a sanatorium his economic future would be in jeopardy. If the patient could feel certain that his job would be waiting for him on his return from a sanatorium, if he were sure that when he was asked what he was doing during this absence his answer would not mean that all doors of employment were closed to him, he could cheerfully accept treatment. To secure the treatment of early cases their freedom from economic chaos must be guaranteed. The public health service working under the county councils has prepared schemes embracing the medical aspect, but has only slightly, if at all, touched the economic aspect, while the boards of guardians have in some measure tackled the economic side of the question, but very imperfectly. The recent union of these two services combined under one local authority provides a great opportunity for dealing with tuberculosis on the broad lines which logically should be adopted. To divorce medical treatment of the disease from the economic treatment found necessary has been responsible for the lack of efficient after-care in the past. To amalgamate forces for the combined medical and economic treatment is not only obvious but will, in the immediate future as well as in the long run, save the country a great sum of money. But it is not possible to persuade employers to take back the employee. They will not do it, and it is no good shifting the burden of unemployment of the tuberculous on firms and employers who are already paying the State to do the very thing. It is as if we said "We cannot solve the problem, so let us shift it on to manufacturers and other employers to solve for us." All who have worked in the tuberculosis field know that a solution cannot be obtained in this direction, and that the difficulty of persuading employers of labour to act as philanthropists on a large scale should have been foreseen. It is economically impossible for them to do so, and it is therefore essential to find some other method of solving the problem of the employment of the tuberculous.

The alteration in the administration of local authorities which came into force on April 1st of this year makes it possible to take a new view of the after-care of tuberculous persons. For the first time one authority, and one authority alone, is responsible for the three aspects of the tuberculosis problem, the medical, the social, and the economic. Before this time these three corner-stones were in three different buildings, as it were, each supporting structures which should have been amalgamated into one concrete whole. We are now placed in what should be a favourable position to keep these three essentials as one. The medical aspect can be securely dovetailed with the housing question; both can be anchored to the key of the situation—namely, the economic. Progress on broad sound lines should now be possible. Local authorities are already manifesting great interest in the question, and naturally the finance of the scheme interests them not a little. It is not necessary, however, for any local authority to find all the capital involved so long as it will bear its fair share of the expenses of each patient and his family.

Village Settlements: Suggestions as to National Development.

I recently submitted a memorandum to the Ministry of Health indicating the difficulties now standing in the way of an increase in the number of village settlements, and suggesting means by which they can be overcome.

There is, the Memorandum ran, no doubt that further village settlements would be established around and adjoining existing sanatoria if the primary obstacles of finance and of personnel could be surmounted.

(A) Finance.

The capital cost of a village settlement of the size of Papworth, excluding the hospital and sanatorium section, should not exceed £100,000. Such a settlement could house and support some 500 persons, including 100 married and 80 single tuberculous breadwinners who would be unemployable in any but village settlement conditions.

The cost of maintaining these 500 persons at a village settlement should certainly not exceed £1000 per annum. At Papworth the community only incurred a trading loss of some £150 in 1928, so that £1000 should be an adequate figure to meet almost any contingency.

The cost of maintaining these same 500 people outside a village settlement, however, would be far greater. With the breadwinners precluded from winning bread they could not avoid becoming a public charge. The tuberculous breadwinners would in many cases spread infection amongst their families and, through a breakdown, be compelled to be readmitted to sanatoria. Estimating the cost of normal maintenance (from the unemployment fund, friendly societies, the guardians, and other sources) at a minimum of 10*s.* per person per week, an annual charge of £13,000 is produced. The cost of readmitting a proportion of these tuberculous persons to sanatoria, and admitting new cases infected by them, would almost certainly represent a minimum additional annual charge of £1000. On quite a conservative basis, therefore, it is evident that the cost of maintaining these 500 persons outside a village settlement amounts to at least £14,000 per annum. Charges at this rate are in fact now being borne by the various public and private bodies who are responsible for the care of tuberculous workers and their dependents.

The admission of these 500 persons (men, women, and children) to a village settlement would therefore save these bodies not less than £13,000 per annum. £13,000 per annum is sufficient to provide for the service of a 5 per cent. loan of £130,000, amortising the whole sum in 15 years. Therefore, if the public and private bodies above referred to were to be given the statutory power to divert their relief expenditure in such cases to the service of village settlement loans, they could borrow the whole of the necessary capital in the ordinary way, and repay it within 15 years. At the end of this period the settlements financed by this means could accept and provide for normally unemployable persons and their families at practically no cost.

Formation of a National Association.

This proposal could be carried into effect in one or other of two ways:—

(1) By the formation of a Village Settlements Department at the Ministry of Health; or

(2) By the formation of a National Association of Village Settlements on which the Ministry would be responsibly represented.

In the former case the Ministry, on receiving an application from a local authority for the provision of a village settlement within its area, would investigate the circumstances in relation to already existing settlements, local requirements, &c. If satisfied, the Ministry would provide the capital sum required and the local authority would agree to contribute 10*s.* per week per person settled for a period of fifteen years, and 1*s.* per week per person settled thereafter. These contributions would repay the capital sum advanced, with interest, and provide adequately for any revenue losses incurred. No cost whatever would fall upon the national exchequer.

In the latter case an association not for profit would be registered under Section 20 of the Companies Acts, and managed by an expert body approved by the Ministry of Health. This association could affiliate to itself such approved existing settlements as might wish to join; and any local authority desiring to establish its own settlement would be advised to apply to the association. The association would then carry out the investigation indicated in the preceding paragraph, and in the event of approval would undertake to establish a settlement for the reception of suitable cases nominated by the authority on exactly the same terms. The contract with the authority would form the basis for an issue of 5 per cent. debentures by the association. Such an issue, secured upon a contract with a municipality, would rank with corporation issues; and if, in addition, a Government guarantee as to capital and interest were provided, the issue would rank as a trustee security. Practically no risk would be incurred by the exchequer under such a guarantee, and its grant might enable the issue to be made at a lower rate than 5 per cent., while the whole business of the association would, of course, be subject to the close scrutiny, if not the absolute control, of the Ministry of Health.

Of these two methods I am inclined to advise against the adoption of the first, since each settlement would have its own industries, and the fact that these were directly controlled by the Ministry and local authorities might create opposition to the whole scheme in certain quarters. Under the second scheme, this objection could not be maintained, while the Ministry would have almost as great a measure of control as it would under the first scheme.

Three Practical Points.

Attention is directed to three points:—

(1) That the figures employed are not intended to indicate the "ideal size" of a village settlement. They are simply used as an illustration. The size of a village settlement is only limited by its own inertia.

(2) That the whole of this scheme can be carried out without adding one penny to present expenditure upon social and health services. On the contrary, there would be a considerable ultimate economy depending entirely upon the extent to which the scheme was developed, for after the repayment of the original capital sums, the weekly contribution per person settled could be reduced to 1*s.*

(3) That the only action which need be taken by the Government is that required to secure the passing of an Act enabling local authorities to participate in the scheme in the manner proposed.

(B) PERSONNEL.

Past experience has shown that village settlements may cost so much to maintain as to render them impracticable, however desirable they may seem on medical and humanitarian grounds. So far from contesting this, I admit that village settlements may prove highly expensive; indeed, I would go so far as to say that they are bound to be disastrously expensive unless the personnel, both medical and industrial, is most carefully selected. This care in selection extends not only to those holding executive positions, but to those selected for settlement also, and local authorities should bear in mind that not only will a certain proportion of medically suitable cases decline to enter a village settlement, but that a percentage of those who are medically suitable and willing may be temperamentally unsuitable. It is for the residue that village settlements are needed, and that residue will increase in numbers as the scheme develops and its advantages become more apparent; so that while the number of suitable persons desiring settlement may not now be large, it will tend to increase more and more rapidly as time goes on.

Provided that the right principles are adopted there is no reason for any village settlement to fail. At Papworth certain principles have been evolved by the process of experiment, and their adoption at Preston Hall has met with success. It is not too much to suggest, therefore, that if the principles of village settlement work are fully understood and rigidly adhered to success will result.

It would, in my view, be a great mistake to sanction the establishment of large numbers of village settlements before trained personnel is available to guide them. And since theoretical training alone is useless, I suggest that the Ministry should sanction the training of medical personnel at Papworth and Preston Hall, though I have no authority to speak for Preston Hall.

While there is at the present time a dearth of medical and industrial personnel with village settlement experience, there is no reason to believe that this condition is chronic. As the scheme develops so will personnel become available, since village settlements provide considerable scope for enterprise both in medicine and in other branches of endeavour, and the association of reasonable remuneration with scope for initiative represents a combination which has never yet failed to attract the best elements in the population.

Let us clear our minds for a moment as to what we are attempting to do. It is nothing less than to stamp out tuberculosis. Everyone agrees that to do this the early cases must be treated and cured. But, as already pointed out, early cases are not available for treatment, on account of the fear of thus ruining their future economically. Suppose, however, that this fear of economic disaster can be removed, and that a man knew in the event of his becoming tuberculous that he would receive immediate treatment, that his family would be supported while he was receiving treatment, and that if he proved to be suffering extensive and permanent damage he would be able to live and work permanently in a village settlement with his family, the whole tuberculosis problem would be altered. Let us remove the fear of poverty after treatment by making it known that village settlements exist to protect the tuberculous worker from the economic consequences of his disease and manifestly there will be many more early notifications. Even so, many cases would not be discovered until too late, until, that is, extensive damage had been done, but the ratio of early to moderately advanced and advanced cases would slowly but surely increase. Instead of 40 per cent. sanatorium discharges requiring permanent settlement, the proportion would diminish to nearer 20 per cent., and the remainder—i.e., 80 per cent.—having received treatment early, would be fitted to resume work as economic units in the outside world.

TRAINING OF YOUNG CHILDREN.

PROF. BLATZ'S LECTURE.

ON May 13th, at University College, a lecture entitled Modern Theories of Habit Training of the Pre-school Child was given by Dr. W. E. BLATZ, assistant professor of psychology in the University of Toronto. Prof. C. E. SPEARMAN, F.R.S., in introducing the speaker, said that the movement in favour of child guidance was spreading rapidly. Experience showed that adult criminals and undesirables had nearly all been difficult or undesirable children. England had been tardy in adopting the movement, in which the United States of America had led the way. The United States were fortunate in many ways; for example, the different States were independent, and those which were progressive enjoyed great opportunities in consequence; besides this, wealthy members of the community would contribute freely to institutions both in their own country and abroad; they were even ready to subsidise the trial of new methods. They had established a child guidance clinic in this country and had invited a number of persons to visit similar institutions in America, and he had himself accepted such an invitation. But he could say that he had found the best work in this field at Toronto under the inspiration of Prof. Blatz. In a pre-school nursery there he had seen 17 children playing with an entire disregard of the students who lined the walls, and made systematic observations. Prof. Blatz had a more substantial backing of evidence than was usual with speakers on this subject.

Prof. BLATZ began his lecture by saying that he had never been satisfied with the analysis of motives found in text-books. Either this subject was crowded into a few paragraphs at the end of a chapter or a whole book was written about it, with recurrent use of the word "instinct." He proposed to speak entirely of children under five years of age, and to avoid the words "instinct" and "purpose."

Any factor which influenced human behaviour could be called a motive; he made no attempt to distinguish between motives arising outside the organism and those from within, because the individual was never separated from his environment. He must also deny that he was a "behaviourist," since it was impossible to maintain a strictly behaviourist psychology in dealing with living persons.

The Primary Motive.

To interest the psychologist the child must be born alive, and must express life in terms of the function of the whole. The primary motive was life. Children in all circumstances did something, performed some action, and at some stage they attempted to answer the question: "Why am I alive?" The foundation of all religions was an attempt to answer this question, but so far none had answered it in a way which was unassailable. Before the age of four the child was little interested in the answer; from four onwards he began to ask questions having a bearing on it, but up to that time he was not affected by the primary motive of life. Secondary motives must therefore be considered. Why did a child do the things he did? Why did he eat his food on one occasion and fling it at his nurse on another? The case of the mother who had been advised by the pædiatrician to give her child spinach might be considered. She stood over the child with anxiety on her countenance, offering spinach; the child, realising the anxiety, felt that this was the moment to assert himself and throw the spinach on the floor.

The Attitudes.

Adults were described as having differing tastes, and taste was sometimes called feeling tone. There was no such thing per se; all tastes developed from a form of behaviour present at birth. If a new-born child were allowed to suck a finger dipped in a solution of sugar he would behave in such a way as to express satisfaction, while if the finger had been dipped in a quinine solution the response would be one of resentment. There was therefore a twofold result to all sensory impressions—acceptance and rejection. They were antitheses and could not appear simultaneously. From these the child developed a series of reactions to all sensations, and a classification was gradually built up. But an error crept in which made him ascribe the quality to the object, not to himself. Pleasantness or unpleasantness was not really resident in the object but in a concept which he had to develop. This was proved by the fact that tastes were divergent; one object was not the same to all persons, nor did it necessarily remain the same to any given person.

To take an example, if a hungry boy was offered a slice of jam roll he would eat it with enthusiasm, but if helpings were continued indefinitely he would at last reject it, and might even perform the final act of rejection by vomiting. The rejection of children was similar to the disgust of adults, and the taste of adults depended on training, not on inherent qualities in the object. This meant that we held the taste of our children in our hands; we could decide whether they should have a preference for jazz or classical music. In Austria small children were being encouraged to paint, and showed tastes usually ascribed to adults. By analysing his past history it was possible to decide whether or not a child would eat spinach, and by training it was possible to get him to eat anything he was offered. At the Toronto clinic children took cod-liver oil readily, and asked for it if they were accidentally passed over, simply because they were taught to regard it as a food. If it were treated as medicine and the child was forced to take it the atmosphere would demand resistance on his part.

The Appetites.

The appetites, of which hunger, thirst, rest, elimination, and sex, were examples, were connected with physiological functions of the body, and waxed and waned in intensity. Five to eight hours after birth a child became restless and cried; it was then fed and fell asleep. After a few hours the same cycle would be repeated, and the waxing and waning of hunger would continue throughout life. Nobody knew when we ought to be fed, how much, or why. The pædiatrician asserted that it should be every four hours during infancy, without night feeds, and after a fortnight of this routine a child would be hungry at the correct times. This appetite, then, had a physiological background; it was cyclic, had a sensory component, hunger, and could be brought under individual and social control. Training arranged that the behaviour called forth by hunger should be socially acceptable. Later training would enable the child to use the socially accepted implements to feed himself.

Sex was a similar phenomenon to hunger. Like hunger it was potential at birth, and did not depend on puberty for its development; masturbation quite commonly occurred at six months. The cycles were longer than in hunger, but it could also be subjected to a definite control, both individual and social. The social control in this case was enormous, with laws to enforce it, though no one would think of taking legal measures against a man who ate with his knife. Sex was no more important than hunger, and possibly somewhat less so; but no time was spent on sex education and not more than 5 per cent. of persons received considered instruction before marriage. Children were left ignorant on the subject, and this was the reason for the many cases of sex delinquency. They should be instructed in this subject as carefully as they were taught to eat.

Elimination was wrongly regarded by many persons as a function directed by Providence.

Bed-wetting, for example, should never occur after 2½ years of age. Of the cases that persisted beyond this age 2 per cent. were pathological, but 98 per cent. were amenable to habit training and could be cured in six months. It was impossible to exaggerate the effects on a child of this condition. He was exposed either to punishment or ridicule, and his sense of inferiority made it impossible for him to adjust himself to his surroundings.

Sleep was the response which the child acquired as a satisfaction of the appetite of rest. A child should be taught when and how to sleep. The text-books said that during the first month of life a child slept 22 hours out of the 24; by actual observation he had never found the hours of sleep to exceed 18. No one knew how long we ought to sleep, and it was entirely a matter of habit and convenience.

The Emotions.

Watson had made the first really valuable experiments on emotions in children. He found that infants were potentially emotional, but showed only two types of emotional response; the first was fear, which was produced by a sudden change in environment, such as the occurrence of a loud noise, and it was expressed by a movement of flexion and a sudden inspiration. Anger, the second emotion, was produced by preventing the child from fulfilling some some desire. If the wrist were taken between the observer's finger and thumb so that the child could not withdraw the hand, it would first make vigorous attempts to free itself; when it failed it would express its resentment by a movement of extension and an expiratory cry. The infant had no other emotions, and adult emotions were complexities of these. It was impossible to stamp out fear or anger, but we should train the child to fear those things which it was socially acceptable that he should fear, and be angry when it was socially accepted that anger was desirable.

A child should never be given what it wanted when it showed anger as otherwise it would count on gaining its ends in this way. But it must not be concluded that every child who showed anger was spoiled. Anger was a normal quality at 2 years of age; it increased up to 3, and then gradually diminished up to 5.

The psychiatrists talked of psychotic children, but Prof. Blatz did not recognise such cases. In all the examples he had observed the fault had lain in the training. He had seen a 6-year-old boy, described as psychotic, in a children's court, who had refused to answer the questions of a Binet test. At last his mother had been sent out of the room and he had been told she would not return until he consented to do the test. For 18 minutes he had given an exhibition of mania, flinging objects on the floor, and shouting and screaming. No one had touched or interfered with him. At the end of that time he had stopped and seated himself, the mother had come in, and he had performed the tests. The mother, however, had been less educable. She had seized him, exclaiming: "Wait till I get you home!" But when that boy was placed in a proper environment, as he would be, he would find this behaviour would not get him what he wanted, and would become normal. His intelligence quotient was high.

Self-assertion reached fruition at the age of 2, and remained one of the most potent motives throughout life.

Prof. Blatz referred to the curious anomaly whereby nursery schools in England and Canada tended to be the monopoly of the children of the under-privileged classes. In Canada children were expected to attend school from 8 to 16 years, so that all their important years of early childhood were unsupervised. He hoped to see a revision of the law, requiring children to begin school at 2 years and to leave when they had completed the curriculum adapted to their intellectual level.

SCOTLAND.

(FROM OUR OWN CORRESPONDENT).

Insurance Data for Medical Research.

I AM glad to see, from the First Annual Report, that the Department of Health for Scotland are "considering a method whereby the particulars recorded on medical certificates may be made available to them shortly after issue. This would give complete and trustworthy data from which may be compiled statistical records showing, inter alia, the illnesses to which incapacity is ascribed and the loss of working time in each area arising therefrom. It is hoped, incidentally, to adapt this procedure to supply information on certification which is necessary for administrative purposes." The Department are to be congratulated on this effort to make some use of the hundreds of thousands of medical cards now in their possession. Some years ago the Ministry of Health Medical Department issued an admirable study on rheumatism and the data were taken from the records of the insurance practitioners. Why these data have not been studied on a much larger scale is difficult to explain either for England or for Scotland. The insurance practitioners are required to make returns and fined if they do not. It is regrettable that this gold mine of medical facts has received so little attention during these 18 years.

Insurance Domiciliary Service and the New Local Government Act.

The Department are also giving careful consideration to the problem of securing to the insured person the institutional advantages of the new Act. "With the passing of the Local Government (Scotland) Act, it is to be expected that local authorities in Scotland, in coöperation with the great voluntary institutions which have served the insured and non-insured population in the past, will develop a service which will be of great value to all. The Department realise that to secure the fullest value from the organised medical services of the country a definite relationship must be established between the insurance practitioner and these institutions, and consideration is being given to the best method of securing full consultation and coöperation between all the parties concerned." This great flaw in the insurance system will now be rectified. It is gratifying to find that this immense clinical problem is brought by the Department into the front place. This new departure in "treatment" policy, as well as in the handling of the medical returns, will be welcomed by all interested in developing the efficiency of the national insurance system.

Edinburgh Royal Infirmary Appeal.

The appeal for £500,000 for Edinburgh Royal Infimary is now being launched, and at a meeting, convened by Lord Provost Whitson, officers were appointed to take charge of the procedure. Colonel J. M. B. Scott was appointed Appeal Director, and Mr. J. D. Imrie, City Chamberlain, will act as honorary secretary and treasurer. The case for extension of the infirmary is overwhelming. From time to time facts about the waiting-lists have been published, and however they may be interpreted, they are always disturbing. But there is now a general consensus of lay and official opinion that the time has come for a large expansion. The Town Council, under the new Local Government Act, is proceeding with the correlation of all its medical institutions; but this will not in any way interfere with the great appeal of the Royal Infirmary. To judge by the other Scottish hospital appeals, Edinburgh is likely to have a handsome response. It is not without significance that the 250th anniversary of the Royal College of Physicians comes next year, and, as the College was really the originator of the infirmary, the interest created by the anniversary will help the principal medical institution of the East of Scotland.

IRELAND.

(FROM OUR OWN CORRESPONDENT)

Cecilia-street School.

IT was announced last week that the last of the departments of the medical school of University College, Dublin, working in the old Cecilia-street School of Medicine, was finding accommodation in the college buildings in Earlsfort-terrace, and that the old premises—which had housed a medical school for almost a century—were about to be vacated. In 1836 the existing premises came into the possession of the Apothecaries' Hall, which there established a medical school. This had various vicissitudes, but about 1850 its fortunes dwindled, and a year or two later it was closed. The premises were then purchased by the recently established Catholic University of Ireland, and a medical school was again opened. It continued in full work until the establishment of the National University of Ireland in 1908, when it became the medical school of University College, Dublin, one of the constituent colleges of the University. Within the next few years most of the departments were transferred to the new college buildings in Earlsfort-terrace, and the transference will now be completed. The history of the school from 1859 to 1908 is one of great courage and zeal, overcoming almost incredible obstacles. The school was unendowed, and unable either to expand in space or to equip itself adequately, but during all these years it gave a sound training in medicine to successive generations of students, having sometimes on its books the largest roll of students attending any Dublin school. Its success was only possible by the self-sacrifice and devotion of a series of distinguished teachers.

Before the building of the first school by the Apothecaries' Hall the site had an interesting history. In 1259 it was granted to the Augustinian friars for their first monastery in Ireland, and they continued in possession until the suppression of the monasteries in 1539. The site was then granted to one Richard Nagle, the last Prior, who accepted the reformed faith. It passed through various hands during the next two centuries, and the house which replaced the old monastic buildings was at one time the office of the Down Survey, the first survey of Ireland, carried out in Cromwellian days by the famous Sir William Petty, the founder of the Lansdowne family. At this time the grounds were a physic garden owned by an apothecary named Wetherel, in whose house many of the early meetings of the Dublin Philosophical Society, now the Royal Dublin Society, were held. In 1731 a music-hall was built here, which some time later gave place to the famous Crowe-street Theatre, where Peg Woffington first appeared, and where Kean had some of his greatest triumphs. A few fragments of the fabric of the theatre are still seen in the building of the school.

Free State Medical Registration Council.

The vacancy in the direct representatives of practitioners on the Irish Free State Medical Registration Council was filled last week by the election of Mr. William Doolin. His election was unopposed. Mr. Doolin is a graduate in medicine of the National University of Ireland, and a Fellow of the Royal College of Surgeons in Ireland; he is one of the surgeons to St. Vincent's Hospital. He has been for several years honorary secretary of the Dublin Local Medical Committee. He has proved a very competent editor of the *Irish Journal of Medical Science*.

MEDICINE AND THE LAW.

Sale of Practice: Agent's Claim for Commission Fails.

IN the Greenwich County Court on May 7th a firm of medical agents unsuccessfully claimed £62 10*s.* in respect of the sale of a medical practice. It appeared that the defendant practitioner had at one time engaged an assistant through the agents. The assistant did not buy the practice but, when the services of a second assistant were required, he introduced a third practitioner who bought it, the new-comer being a personal friend. The plaintiff firm's case was that the defendant practitioner had asked them to find him an assistant who would ultimately buy the practice. The defendant practitioner's case was that the purchaser was not introduced by the agents but was procured independently. The purchaser gave evidence for the defendant. When he first came as assistant, he said, he had no idea of buying the practice; subsequently he himself volunteered the offer to buy. The county court judge accepted this evidence and found against the agents whose evidence, he said, was of the vaguest. The onus was upon the agents to show that through their efforts the sale was brought about. It seemed, however, that the sale was actually brought about quite independently of their efforts. All the agents did was to introduce an assistant; they never introduced the purchaser.

Details of the sale agreement were given during the case, the figures being required in order to justify the amount of the plaintiffs' claim. The price was £2850, including £1100 in respect of the lease. For some reason not readily apparent, the defendant practitioner was cross-examined as to his previous sales of practices. He explained that he left hospital in 1920, set up in practice for himself in the following year in an eastern district of Greater London, and presently sold his practice for £4000. In 1925 he worked up a practice nearer the centre of London which he sold for £1750 with £300 for the lease. He next went to a well-known suburb for two years where he disposed of his practice for £4000. Asked if this plan of building up practices, selling them and moving on elsewhere was usual in the medical profession, the witness replied that it was not unusual; it depended on the temperament of the practitioner; he thought more practices were established by squatting than by buying. The learned judge remarked that the transactions were perfectly legitimate. If the practitioner saw an opportunity of making a profit by sale, he was perfectly entitled to take advantage of it.

SEAMEN'S HOSPITAL SOCIETY.—The annual court of the Society was held at the May Fair Hotel on May 15th, with Admiral Sir Roger Keyes in the chair. Sir Arthur Clarke mentioned the work of the eight establishments for whose upkeep the Society is responsible, and said that the income this year, though £93,000, had fallen short of expenditure by about £2000. Sir Roger Keyes was glad to see present so many friends from overseas, evidencing the wide appreciation there was for the Society's work. The Belgian Ambassador spoke of the great pioneer work done by the Society in the study of tropical diseases, which his countrymen were now following in Antwerp. Dr. C. E. Sundell, senior physician to the Dreadnought Hospital, asked for further support to enable the Society to assist not only the seamen of the mercantile marine but also their wives.

ST. BARTHOLOMEW'S HOSPITAL.—The report for 1929 of the treasurer, Lord Stanmore, recapitulates the story of the great works of reconstruction that are in progress and the "striking and original propaganda" by which it is sought to raise the million of money that is required. It is pointed out that the ten new surgical wards are not an addition but a replacement of a similar number of old wards. The southern extension of Queen Mary's Home will be ready for occupation during the present month and will accommodate 51 nurses; the building will now have 321 sisters and nurses, but since there are 351 members of the nursing staff further accommodation is still necessary. The total income was £198,597 and the expenditure £197,660. The number of new in-patients was 9464, who stayed on an average 21·79 days; the new out-patients numbered 89,515. The hospital's small house property consists of 670 premises producing a gross rental of £49,426; the net receipts from this source, after paying rates, taxes, insurance, management costs, and repairs, were £27,838, or about 56 per cent. of the rentals.

THE FIRST INTERNATIONAL CONGRESS ON MENTAL HYGIENE.

(FROM A SPECIAL CORRESPONDENT.)

(*Continued from p. 1096.*)

Dr. HERMAN BOUMAN, Professor of Psychiatry and Neurology at the University of Amsterdam, spoke on

ALCOHOL AS A MENTAL HYGIENE PROBLEM.

He said that laboratory experiments had shown that even very small doses of alcohol injured the receptive functions—such as perception, memorisation, conception, and attention—in such a way as to cause the incidence of errors. As a result of the appearance of superficial associations without inner contact, the thinking faculty itself became incapable of serving as the basis of any higher mental life and degenerated.

It was important to observe that even in these conditions of slight intoxication self-criticism became less active, and the person tested had the subjective feeling that he had done his work much better than the experiment actually indicated. The result was, therefore, that less accurate perception and more superficial thinking were followed by hasty and inefficient action, which the person tested could not himself adequately criticise, because he had the illusion that he could do his work more easily and better than would be the case in a state of perfect sobriety.

Even very small quantities of alcohol produced a condition that had all the essential characteristics of delirium. The measures taken against alcoholism in the different countries and the organisation of the anti-alcohol movement had come into existence in quite different ways. The aim of an Act in Holland was limitation of "temptation" by restricting, so far as possible, the number of places where strong drink could be sold. This principle had proved sound. In 1877 the consumption of distilled drink per head of the population amounted to ten litres. In 1920 the number of litres per head of the population amounted to only 5·16. An important task remained—to take care of the drinkers who had to be set on their feet again. This was a difficult phase of mental hygiene work. It had been concluded that the best form of organisation for this purpose would be a group of "Consultation Bureaux for Alcoholism." The first bureau was established at Amsterdam in 1909, and since then these institutions had been formed in practically all the greater towns of Holland. In the bureaux a social worker and a psychiatrist shared the work. The bodily condition of the alcoholic was examined, and his mental aberrations, as well as his surroundings, his work, his family, his social behaviour. Though at first exclusively financed through private contribution, the consultation bureaux were now subsidised by the State, the province, and the municipality.

Under pressure of public opinion, the picture of alcoholism in Holland has undergone a gradual change. The admission figures for cases of alcoholism at the clinics have shown a slow but steady tendency to fall, and the mental hospitals have had fewer drinkers among those admitted. Crimes of violence have decreased, and there has been a reduction in the amount of alcohol used per head of the population.

Discussion.

Prof. WILHELM WEYGANDT (Germany) said that since the war alcoholic insanity and criminality had remained lower than in the pre-war years in Germany. This was no doubt partially due to the increased price of alcohol. The number of licensed houses was far too great in Germany; in some industrial towns it was as high as 1 to every 170 persons. He had no doubt that a large percentage of drinkers were psychically abnormal. There was a system of graduated control for alcoholics in Germany ranging from a warning with police probation to institutional care. He thought sterilisation desirable for the hopeless drunkard.

Dr. O. FOREL (Switzerland) said that Switzerland had a very high consumption of alcohol in relation to its population. There was not much organised propaganda against alcohol. In his view legal control on such a matter could never be successful. Negativism was a normal human reaction and any laws to be effective must have the full support of public opinion. Temperance propaganda throughout the world had not so far been carried out with due regard to the psychology of the public. The temperance reformers had been too severe, too superior, and too dogmatic.

Prof. JAN PILTZ (Poland) said that the campaign against alcohol was a question of national efficiency and should be one of the first planks in the platform of mental hygiene.

Dr. W. TREADWAY, of the Public Health Service of the United States, declined to be drawn into a discussion on prohibition. He said that the various articles and reports on the subject would be available to members of the congress.

Dr. DORIS ODLUM (England) spoke of the reduced consumption of alcohol in England since the war. There was a certain amount of regulation of the sale of liquor, but the decrease in drunkenness was largely due to the raising of the standard of living. The question of housing was important in this connexion. The results of experiments in removing slum dwellers into special houses had been extremely satisfactory. The claims of temperance were best promoted by raising the standard of living and by the education of the public in the sense of social responsibility.

Prof. E. RÜDIN, head of the Genealogical Department of the German Research Institute for Psychiatry (Kaiser Wilhelm-Institut), Munich, read a paper on the

SIGNIFICANCE OF EUGENICS AND GENETICS FOR MENTAL HYGIENE.

He said that eugenics investigates how a human being may, with the greatest probability, be brought into the world without unfortunate mental or physical hereditary tendencies. Expressed in terms of social economy, therefore, eugenics means an enormous saving of useless, or partially unsatisfactory, mental hygiene. Prof. Rüdin supplied statistics obtained mostly from personal investigations in his own institution to give an idea of the significance of heredity in the transmission of mental diseases.

If one of the parents is afflicted with Huntington's chorea 50 per cent. of the children will have the same hereditary disease, and the same proportion of the children of parents with dementia præcox or schizophrenia will be mental defectives. If one of the parents is afflicted with manic-depressive insanity fully 33 per cent. of children will be manic depressives, and at least as many will be otherwise mentally abnormal. A large proportion of the children of genuine epileptics are also afflicted, and, as in all hereditary mental disorders, a still greater proportion when the other parent also is not quite normal. Reviewing the anxieties and doubts besetting individuals afflicted with disease who wished to mate, and the methods available for preventing hereditary disease, he believed that voluntary sterilisation (not castration) of the hereditarily diseased or hereditarily defective should be considered, not only because it was statistically, but also because it was individually, absolutely and permanently reliable. It entailed no danger to physical or mental health, nor did it encroach upon the habits of life and the pleasures of life in any way, and would not, if suggested with tact and consideration, produce any psychic trauma.

It was a consoling fact that exactly as diseases and defects were transmitted, so were the tendencies to positive qualities such as talent, and to foster these, thus increasing the public heritage, was one of the chief duties of mental hygiene.

In the course of the discussion Prof. JOUCHTCHENKO (Russia) said that he agreed with Dr. Rüdin on the importance of preventing the reproduction of hereditarily diseased or defective stock. The laws of heredity were not yet fully understood, and it was therefore important to preserve an open mind until more scientific data on the subject were available.

Dr. FRANS ALEXANDER (Berlin) read a paper on

MENTAL HYGIENE AND CRIMINOLOGY.

He said that the form of the question, "Why does a person become a criminal?" was due to lack of knowledge. It presupposed that it was natural to

be a righteous citizen and that a special explanation was necessary when people did not respect social regulations. Psycho-analysis, on the other hand, taught that people come into the world with impulses and instincts that were not adjusted to society, and that they were born as criminal beings in this sense, that if a little child could realise the demands of its instincts it would act as a criminal. The entire development of the instincts of the child from the age of 4, 5, or 6 on consisted of a gradual adjustment of the demands of the instincts to the demands of society—a development that no human being finished entirely successfully. The right form of the question was "Why do not people in general become criminal?" or rather "Through what processes of development does the originally asocial child turn into a social being?"

He differentiated between the chronically criminal, whose treatment belonged to the doctors, and the accidentally criminal, who could be influenced by a change of environment. The tendency to criminal instinctual outbreak was acquired in the indecisive instinctual conflicts of childhood. In this field it appeared that the two great instinctive qualities that had to endure the disturbances of the equilibrium between renunciation and satisfaction were hunger and love. As in other branches of the study of human beings, the sexual factor has been greatly neglected in the study of criminology up to the time of Freud. Our judges still tried to explain every human action by consciously rational motives. To them every phantastically construed motive was preferable to the general instinctive-emotional motive which in fact generally determined any action. The behaviour of the psychopathic or chronic culprit betrayed a clearly irrational trait. It could not be explained by a utilitarian motive; this was the difference between the kleptomaniac and the common thief. The second distinguishing symptom of chronic criminals was their stereotyped form of behaviour. The unconscious demands of instinct conquered without any regard for the experiences of the past or for the present situation, and always in the same manner. The third symptom was psychic conflict. Remorse and condemnation of the act came, but too late; even if conscious condemnation of the act was lacking, unconscious expressions of condemnation were found in the form of self-harmful tendencies. The sick man, that is, the culprit, was mostly an intelligent, often talented man, pleasant, universally beloved, a man who, as if driven by an evil spirit, from time to time committed acts quite contradictory to his character. Behind the myth of the evil spirit lay a true observation; the demon was in this case the powerful, compulsively conquering unconscious. While punishment and threats of punishment might have a terrifying effect upon normal law-breakers, who acted with conscious deliberation, all such measures had the exactly opposite effect upon the neurotic culprits, because they had no approach to the unconscious. Because of the ever-present need of punishment felt by the culprits, threats could even lure them to commit the deed. The punishment endured was the very thing to break down the moral repressions of these people, to lessen their sense of guilt, and to encourage them to new offences. This was the explanation of the obstinate tendency of this group of law-breakers to relapse. Nor was change of environment of any avail. Improvement of the outward conditions of life increased the feeling of guilt, strengthened the need of punishment; the tragic mentality of these people made them liable to commit new crimes just after an improvement in their circumstances. Psychopathic culprits belonged to medicine. The aim of treatment was to make conscious the unknown motives. Only after the control of the conscious ego had been extended over the life of the instincts was it possible to expect restraint of the criminal impulses and to prevent relapse.

Admittedly, however, a certain discontent was characteristic of the civilised man in general, and this discontent—recently called by Freud "discomfort of civilisation"—was relatively independent of mental disease and social position. The increasing organisation of society forced man to an adult life in a higher degree than he could live, and neglected his childish demands. There was an increasing control of the principle of utility and a decreasing of the principle of pleasure. Our mechanical economic civilisation showed this to an extent never before reached. The result was a damming up of the playful, irrational pleasure-seeking formerly associated with human occupations and social activities. This increased the conditions for neurosis and for crime, if at the same time new outlets were not found. In Dr. Alexander's view the most important social problems of future mental hygiene was the development of such outlets.

Dr. V. V. ANDERSON, Director of Employment, Placement and Personnel Research at the Macy department store in New York City, spoke on the

CONTRIBUTION OF MENTAL HYGIENE TO INDUSTRY.

He said that in the department store to which he was attached about 20 per cent. of the employees were what might be called "problem" individuals, and this was probably true of other business and industrial organisations. This group of persons were either liabilities or potential liabilities to the business man; from it were drawn the repeated transfers from job to job, the resignations and the dismissals.

Nineteen per cent. of the salespeople and 23 per cent. of the non-salespeople gave rise to situations that caused their department heads to question the value of their services to the store. As the psychiatrist saw these individuals, they presented distinguishing physical and mental characteristics. He was impressed with three outstanding causative factors: (*a*) a maladjusted personality; (*b*) specialised job disabilities; (*c*) faulty physical conditions. As the employer saw them, they were production problems, or chronic health problems, or chronic attendance problems, or disciplinary cases—and from his point of view he was better off without them. From the medical and mental-hygiene point of view, however, many of these individuals might, through treatment, be adjusted and become assets to the employer, thus cutting down turnover among employees and increasing production efficiency. The records at the Macy store showed a sufficiently large number of improvements under psychiatric treatment to make the application of such measures profitable, not only in terms of human salvage, but in terms of dollars and cents. Of the last 500 problem cases, 67 per cent. were still in the store, 23 per cent. had been dismissed, 8 per cent. had resigned, and 2 per cent. were pensioned. Of the active cases, 40 per cent. had been adjusted and were no longer problems to their departments, and 44·7 per cent. were still under treatment.

Every department head had tried various methods of dealing with such employees—fatherly lectures, additional training, transfers, and finally dismissals. There could be no denying that it paid in time, money and energy to have each of these employees adequately studied before wasting energy on such methods. As a result of psychological tests and other methods of picking automobile drivers more carefully, driving accidents in the firm had been reduced by 50 per cent.

Mrs. SIDONIE MATSNER GRUENBERG, Director, Child Study Association of America and Consultant in Parent Education of Columbia University, spoke on the

SIGNIFICANCE OF THE HOME IN THE PERSONALITY AND CHARACTER DEVELOPMENT OF THE ADOLESCENT.

She said that during the development from infancy through the subsequent stages of growth, the home stood out as the most important single influence. To-day many are familiar with some of the emotional motives of this family drama, especially the emotional states of the parents in relation to their adolescent children: the mother seeking a husband substitute in her son; the father seeing the mother image in his daughter; parents everywhere hoping to relive or to perfect their own lives through the lives of their children. Thus they centred about their sons and daughters conflicts growing out of their own social strivings, their money strivings, their love strivings, and because of these too often imposed upon their children false standards and expectations. The resulting tensions and fixations were stumbling-blocks to normal growth from the earliest childhood years, but it is in adolescence that they took their most visible toll.

Until very recently this family drama had gone on behind closed doors, and parents were still inclined to resent inquiries from any outsider about what happened in the home. Until recently it had been taken for granted that

with the moral and psychic health of their children parents must struggle alone, although it had long been respectable to seek expert advice in the prevention as in the cure of physical disorders. The modern home had lost certain educational and disciplinary opportunities which existed before the introduction of labour-saving improvements—the discipline of disagreeable but *indispensable* service, the challenge to ingenuity and invention, the daily exercise in adaptability. A good housewife formerly maintained her status and perhaps also her self-respect even if she proved to be a rather incompetent guide for her children; to-day if she failed as a mother she could not fall back upon compensating virtues as cook or laundress. With the father economic competence was still basic, but both parents were coming more and more to be judged by the relationships that they succeeded in maintaining between the constituent members of the home. Although most of their own work had been taken out of the home, parents still influenced children through their reactions to their own standardised drudgery. If children grew up seeing only the disagreeable aspects of the life of labour, aspirations would naturally turn toward means of escape, or the outlook would become one of resignation and dull indifference. The maturing process of the modern child was apt to be delayed by the lengthening of the period of schooling and the consequent freedom from economic obligation. The very unreality of high school and college life artificially prolonged childhood. The allowance and the opportunity to earn should thus be a part of every child's experience. Boys and girls especially at school and college were appallingly unaware of alternatives, almost totally innocent of experience in the making of choices.

It was most important for parents to recognise and to accept, in their own attitudes and their explicit teachings to their children, the fact of a changing order. Many of the deep convictions of yesterday turned out to be parochial customs for which the rest of the world to-day has but a smile of patronage. The same was true of our attitudes toward sex. There remained in our civilisation vital functions which the home—and the home only—could fulfil.

Miss EVELYN FOX, Hon. Secretary, Central Association for Mental Welfare, Great Britain, spoke on

COMMUNITY SCHEMES FOR THE SOCIAL CONTROL OF MENTAL DEFECTIVES.

She said that while every civilised country was making efforts to provide schools and institutions for some of its mental defectives, little had been done toward establishing a system of social service that would be available for all defectives living in the community. She outlined the principles on which such a service should be based. The only really satisfactory criterion of mental deficiency was the social one, and if a person suffered from a degree of incomplete mental development which rendered him incapable of independent social adaptation and which necessitated external care, supervision, and control, then such person was a mental defective. That was the definition given in a recent British Government report. For purposes of training defectives could be divided into two groups: those who must be sent to institutions and those who could be trained in their own homes or by foster parents. The training outside an institution was, in Miss Fox's view, preferable for both imbeciles and feeble-minded of a stable temperament who appeared capable of being controlled and occupied, given a good type of home and intelligent parents or foster parents. Under these conditions, the defective in the home had opportunities of meeting and surmounting everyday difficulties, of adapting himself to varied surroundings, of being thrown with the same people he would meet in later life, of growing up in the same world to which he must later fit himself. The statement was made over and over again in all countries that imbeciles should be trained in institutions. Experience in England had shown that imbeciles and low-grade feeble-minded children with decent homes and in attendance at occupation centres could be successfully trained, and that the possibilities of their social adaptation were at least as great as for those trained in institutions.

Dr. GEORGE S. STEVENSON, Director of the Division on Community Clinics of the National Committee for Mental Hygiene, discussed

THE CHILD-GUIDANCE CLINIC: ITS AIMS, GROWTH, AND METHODS.

He said that the child-guidance clinics now in existence had been created largely within the past ten years. It was their purpose to treat the behaviour disorders of children, such as tantrums, stealing, seclusiveness, truancy, cruelty, sensitiveness, restlessness, and fears. The aim was to produce a more efficient, productive, and harmonious adult and a healthy mental life during the period of development. The clinic worked largely with the pre-school child and his parents, since parental ignorance and early habits and attitudes were major contributors to the behaviour problems of childhood. The clinic maintained a threefold staff, psychiatrist, psychologist, and psychiatric social worker.

The first child-guidance clinic was initiated in 1909 by Dr. William Healy in Chicago. In 1922 the Commonwealth Fund launched its programme for the prevention of delinquency and carried on a five-year term of demonstration and experimentation, and since then the movement had grown at a great rate. The Commonwealth Fund had also created a national bureau for child-guidance work, being the Division on Community Clinics of the National Committee for Mental Hygiene. This bureau coördinated the work of existing clinics and assisted in the planning of new ones. To-day there were about 500 clinics in the United States giving psychiatric service to children. Only about a quarter of these, however, which had a threefold staff, should be considered child-guidance clinics.

Of the 25 outstanding child-guidance clinics, nine were supported by the Community Chest, a coördinating and money-raising organisation for all the social agencies of a community. Practically all child-guidance clinics accepted responsibility for community education in the mental hygiene of childhood. Few community groups, social or industrial, had taken advantage of those reliable mental hygiene facts that could aid them in their jobs. Parents, of course, had the broadest needs. But there were also professional groups—the court, the school, the social service agency, the church, and the doctor—who were daily being given the more serious problems of the children of the community to deal with or advise about. These groups could use the experiences of child-guidance clinics to serve their own clients and patients. The appeal of the work of the child-guidance clinic was such as to tempt unprepared persons to undertake it. Behaviour problems of children could be dealt with by others than psychiatrists, but such work was satisfactory only when the contribution of the pyschiatrist to the more complex cases and the importance of the physical condition in all cases were recognised and actually influenced the procedure.

There was a decided shortage of persons to fill positions in child-guidance clinics. At the present time there were attractive positions vacant for psychiatrists. This shortage was the result of inadequate psychiatric education in our medical schools and the lag that appears between demand and supply due to the time required for training. A similar problem existed in respect of psychiatric social workers, but the training centres for child guidance were rapidly increasing.

Dr. OTTO KAUDERS, Assistant, Clinic for Psychiatry and Neurology, University of Vienna, spoke on

SEX AND CIVILISATION.

He discussed the adjustments required between the individual and the community. Human civilisation must ask from each of its participants not only the resignation of the satisfaction of a part of his sexual desires and of his possibilities of sex experiences, but also the resignation of the satisfaction of a great part of his ego, of his instinct for self-preservation, of his desire for power.

Mental sex hygiene did not pretend to influence in a decisive way the special individual laws of cultural development that stamped the sexual life of the time. But while it endeavoured to intervene objectively, investigating and helping practically, in all important points of contradiction and agreement

between civilisation and sex, its ideal purpose was to bring the impulsive human being into harmony with his just desires for sexual happiness and also with civilisation, whose servant it was his duty to be.

MANCHESTER MEDICAL SOCIETY'S LIBRARY.

A GIFT TO THE UNIVERSITY.

THE Manchester Medical Society has given its valuable library to the University, and this transfer of ownership is a landmark in the scientific life of the town. It settles a problem which has been a recurring source of discussion in the local medical world in cycles of about ten years—namely, the possibility of forming a medical institute in the town and removing a big library to it. Founded in 1834, the Medical Society had its quarters in the centre of the town until 1874 when they were moved to the new buildings for the medical school of the Owens College. The college undertook to house the library and to find the necessary accommodation for a reading room and meetings, and to contribute an annual sum for privileges to its staff for use of the society's books and periodicals. This arrangement has been in existence until the present day. The society's library has grown from 1075 to 35,000 or more volumes, and besides these the university has, in the library, another 20,000 volumes purchased out of its own funds or received by gifts, the chief of which were the libraries of the Manchester Royal Infirmary and the St. Mary's Hospitals, each about 7000 volumes. Both these libraries occupied space in the hospitals which was urgently needed for other practical purposes. The cost of maintenance of libraries has greatly increased in recent years because of the price of books and periodicals, and of the latter especially the first-class German journals. Unfortunately the society's income has not grown in like manner and is nearly stationary. The subscription has only been one guinea, attempts to double it having failed owing to the average practitioner not appreciating the value of such a library. The society, therefore, has found itself unable to bear the burden of responsibility for maintaining the library in spite of a large grant from the university. Whilst the library provides many books of interest for its ordinary members it is especially valuable for research, and to facilitate this small sub-libraries in anatomy, physiology, therapeutics, and gynæcology have been formed in these departments. It was felt that such a library could never be moved from the centre of research, whatever developments there might be in a scheme for a central meeting place for all the scientific societies of the town. Hence the decision, after anxious deliberation over several years, for the step which has just been taken. The university now owns the library and undertakes its maintenance with a definite annual contribution from the society, in return for which the members of the society have all the rights of use that were asked for and also access to the large general Christie library of the university.

The Medical Society's library contains information of inestimable value to the scientific research worker, and to the would-be medical historian. There are many rarities on its shelves. There are a dozen incunabula, the earliest dated work being 1480 from a Venetian press of an Italian translation of Guy de Chauliac's "Chirurgia Magna" which was the text-book of surgery in several languages until beyond the sixteenth century. Only two other copies of this work are known. There are close on 600 books printed by foreign presses before 1600, 200 being dated before 1550. Fine copies of early editions of all the classical writers in medicine, many in Latin or Greek, are on the shelves, and book-lovers will be delighted with the study of those from the Aldine and Elzivir presses. There are 150 copies of English printers' work before 1675, and 250 before 1700. The earliest dated book in English is a Herbal, 1548, the author of which is not stated and of which no other copy is known in libraries. Bound up with this, which is in black letter type, are four other tracts in similar type, one being "The Myrrour or glasse of helth," by Thomas Moulton—a "Doctour of dyvynytie," and chiefly concerned with advice about avoiding the plague as derived from the influence of the planets on health and disease. The library has been added to by gifts from its members—a special lot of many hundreds being left to it by the late Dr. Percy Cooper. A new feature of it is a collection of all information of local medical historical value, biographies, portraits, hospital reports. Anything of this nature will be gladly accepted by the library from our readers.

Public Health Services.

REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following are some 1929 statistics of two county boroughs, one rural and one urban district:—

Name of district and estimated (R.-G.) mid-year population.	Birth-rate.	Death-rates per 1000 of the population.					Death-rates per 1000 births.		
		All causes.	Tuberculosis.	Cancer.	Respiratory diseases with influenza.	Heart disease.	Infant and neonatal mortality.	Young child (1–5 yr.) mortality.	Maternal mortality from childbirth.
Reading C.B.. (97,050)	14·9	14·1*	1·26	1·57	3·3	1·4	50/27	32	2·8
Bootle C.B. .. (80,400)	20·6	13·6	1·34	1·21	3·7	1·3	83/34	64	3·0
Barnstaple R.D. .. (18,540)	13·8	12·0	0·81	1·56	1·6	2·1	78/—	—	3·9
Ventnor U.D.. (4,982)	11·2	16·0	0·60	3·00	2·4	3·2	71/—	36	0·0

* Standardised, 12·2.

Registered stillbirths per 100 live births: Reading, 3·7; Bootle, 3·9; Barnstaple, 3·5.

Reading.

Dr. H. J. Milligan reports that the birth-rate is the lowest ever recorded in the borough. He thinks we are approaching a time when the birth-rate will not exceed the death-rate, and the natural increase of population will cease. The death-rate is higher than any recorded during recent years and this increased mortality was the result of adverse weather conditions and the unusually severe epidemic of influenza which prevailed during the earlier weeks of the year. The mortality from influenza was greater than in any year since the pandemics of 1918 and 1919. There was the usual concomitant increase in the deaths from bronchitis and pneumonia, which were nearly double the normal annual average. Further, there was an increase in deaths from pulmonary tuberculosis, which was probably associated with the prevalence of influenza. The infantile death-rate was lower than any hitherto recorded, and would have been still more favourable but for the unusually large number of infant deaths from pneumonia during the influenza epidemic.

The borough council has adopted a scheme which will not only meet the immediate requirements of the Local Government Act, 1929 (which came into force on April 1st, 1930), but will provide in large measure for the further development of the services concerned. The council has appropriated Battle Infirmary, and this involves the disappearance of the term "pauper" in so far as it has been applied to sick persons in the infirmary. The council will also be enabled to effect a closer coördination between all

the resources available for the care of the sick and the prevention of disease, as an object apart from the relief of destitution. The records at the V.D. clinic now differentiate between recent infections of syphilis and the later manifestations of the disease, and it is found that new cases of recent syphilitic infection are not numerous. There were only nine such during 1929. On the other hand, there has been a definite increase in the cases of gonorrhœa treated which numbered 79 in 1927, 112 in 1928, and 160 in 1929. The maternity and child welfare work continues to grow and the attendances at centres have increased from 11,000 in 1920 to 28,000 in 1929. Of the 21,386 home visits paid by the health visitors 11,778 were in respect of children aged 1 to 5. The shortage of houses for the working-classes has not been overcome and the housing committee have been unable to rent alternative accommodation for displaced tenants of condemned houses. The committee have, however, made arrangements for the erection of 2000 houses at Whitley. There are still about 2000 applicants for municipal houses and during 1929 an unusually high proportion of the patients admitted to Dellwood Maternity Home were living in rooms. The tuberculosis officer also draws attention to the difficulty in obtaining suitable housing accommodation for tuberculous patients living under unsatisfactory home conditions. Despite all this some progress has been made in closing unhealthy houses and 38 out of 107 houses scheduled for closure have been dealt with during the year.

Increasing attention is being given to the purity and cleanliness of articles of food prepared for sale. There was only one prosecution for the exposure of unsound food for sale and no prosecution under the Sale of Food and Drugs Acts. It seems, however, that the position as to tuberculous milk is not so satisfactory. During 1929 two out of 37 samples were found to be infected, and during the last ten years 27 out of 248. Ten per cent. of the non-designated and unpasteurised milk sold in Reading may thus be expected to contain living tubercle bacilli. The deaths from violence show an increase. Thus there were 64 such deaths during 1929, including 20 suicides as compared with eight or nine in previous years. Dr. Milligan draws attention to the fact that the conditions of life and the prospects of the practice of midwifery are not such as to attract the best members of the nursing profession, and supports his opinion with an analysis of the earnings of the midwives in Reading. The rainfall in Reading during 1929 was remarkable. There were only 21·7 inches as compared with an annual average of between 25 and 26 inches, and of the 21·7 inches 6·33 fell in November and 5·16 in December.

In the school report it is mentioned that through the enterprise of the teachers 22 per cent. of the scholars receive half a pint of milk during the morning session. Increased attention is being given to the teaching of hygiene and the subject now has a definite place in the syllabus of practically all the schools. The erection of the new school clinic will facilitate dealing with the arrears in dental work. A special memorandum by Dr. Agnes Bernfeld, who conducts the ear, nose and throat clinic, will be read with interest by all school medical officers, as it contains a description of the technique of the treatment originated by Dr. Gautier (named by him "diastolisation") and the results obtained by this treatment in Reading during the last two years.

Bootle.

Dr. F. T. H. Wood reports that the birth-rate is lower than ever before, that the increased death-rate was due to influenza and severe cold in the first quarter of the year, and that the tuberculosis death-rate continues as in 1928 to be the lowest yet recorded in the borough. A noteworthy event has been the taking over from the Bootle Health Society of control of the maternity and child welfare clinics. For the purpose the medical and nursing staff has been strengthened, and two additional antenatal clinics have been established and a beginning made with postnatal supervision of the mother. The new cases at the antenatal clinics numbered 35 per cent. of the total births. Invitations were given to the expectant women attending the clinic to return six weeks or later after confinement for examination; 42 women accepted the invitation, and of these 22 were found to be suffering from morbid conditions requiring treatment and 5 of them were referred for admission to hospital. The child of pre-school age is to receive increased attention and the additional staff and clinic provision enabled 332 such children to be dealt with. It is hoped to extend this work during 1930 and to make further use of the specialist clinics of the educational committee for conditions such as squint, ear discharge, and crippling defects. The improved facilities at the council's new V.D. centre at the Bootle Borough Hospital have resulted in a great increase in the attendances. Of 70 new cases of syphilis 31 had contracted the infection more than 12 months before attending. It is pointed out that the increased work and attendances is not due to a greater prevalence of the disease.

A few years ago municipal building activities were increased. Thus the council erected 74 houses in 1926, 182 in 1927, 305 in 1928, and 346 in 1929. The limit of the needs has, however, not yet been reached, for in March, 1930, there remained 830 of the applications previously tabulated and 625 new ones. A small unhealthy area covering 1·02 acres and containing 69 houses has been represented. Progress is being made with plans for a new health centre in the north of the town to accommodate tuberculosis, maternity and child welfare, and education committee activities. The passing of the Local Government Act, 1929, is being utilised to secure as complete coördination as possible of the new and the old medical services. The medical officer of health is also medical officer to the public assistance committee. Deaths from violence numbered 42 and included 11 from suicide. In 1928 45 out of 175 milk samples were found to be adulterated. During 1929, 45 informal and 91 formal milk samples were taken. Of the 91 formal samples 14 were adulterated. Two vendors were fined for selling milk containing added water to the extent of 4 to 5 per cent., while a third was withdrawn on payment of the analyst's fee. Three vendors were fined for selling milk deficient in fat, 31 per cent., 17 per cent., and 8 per cent. respectively. In 6 cases of slighter adulteration the vendors were cautioned. There was one appeal to the cow and one purveyor was fined for refusing to sell to the inspector. The analyst reports that the average of fat in all samples including those adulterated was 3·64 per cent. and of non-fatty solids 8·85 per cent.

Good results are being obtained at Linacre Hospital in suitable cases from artificial pneumothorax. One patient so treated in 1924 has been at work full time ever since. Another first treated in 1925 is now working full time. A third first treated in 1928 has now no symptoms. All these were well-established cases with tubercle bacilli in their sputum.

Barnstaple.

Dr. J. R. Harper notes that the standard of living of the labouring class in his rural district has been improved. Wages have increased, new and more healthy cottages are available, and existing cottages have been reconditioned under the Housing (Rural Workers) Act, 1926. During 1929 the reconditioning of 20 houses was completed and since the Act came into force 49 schemes have been approved. The county council makes hospital provision for smallpox, but Dr. Harper stresses the need for a hospital for other infectious diseases in this area. An important event during the year was the completion of the Combemartin water-supply scheme.

Ventnor.

Dr. R. T. Cooke reports that the urban district council in November agreed to purchase the water undertaking. He remarks that the yield of water at the source is sufficient to ensure the town's popula-

tion a constant supply but that the efficiency of distribution is open to question. The aggregate of bright sunshine for the year taken at the hospital was 2068·6 hours and Ventnor is said to come out best of the 12 stations which send in 12 consecutive monthly returns of ultra-violet light. The sanitary inspector reports that in 1926 the council purchased a housing site for £650 and accepted three contracts for 20 houses, two of which have been completed and the third is well under way. The houses are of the parlour type and of four designs. The cost varies from £460 12*s*. 5*d*. to £499 15*s*. per house.

INFECTIOUS DISEASE IN ENGLAND AND WALES DURING THE WEEK ENDED MAY 10TH, 1930.

Notifications.—The following cases of infectious disease were notified during the week:—Small-pox 462 (last week 306), scarlet fever 1991, diphtheria 1303, enteric fever 85, pneumonia 944, puerperal fever 50, puerperal pyrexia 107, cerebro-spinal fever 25, acute poliomyelitis 3, acute polio-encephalitis 1, encephalitis lethargica 17, dysentery 7, ophthalmia neonatorum 117. No case of cholera, plague, or typhus fever was notified during the week.

Of the cases of small-pox, 222 were returned from the County of London—namely, Bermondsey 3, Bethnal Green 41, Camberwell 27, Deptford 2, Finsbury 6, Hackney 21, Hampstead 1, Holborn 1, Islington 12, Kensington 2, Lambeth 3, Lewisham 4, Poplar 27, St. Pancras 4, Shoreditch 34, Southwark 4, Stepney 25, Stoke Newington 5, Woolwich 1. Outside London small-pox was reported from 15 counties—namely: Derby 3, Durham 3, Essex 60 (of these West Ham 21, Walthamstow 10), Kent 5, Lancaster 13, Leicester 61, Middlesex 16 (of these Tottenham 11), Nottingham 3, Stafford 21, Warwick 1, Wilts 2, Yorks, West Riding 36, Brecknock 4, Glamorgan 14, Monmouth 8.

Of the number of cases in the Infectious Hospitals of the London County Council (the name Metropolitan Asylums Board has disappeared) on May 13th–14th was as follows: Small-pox, 568 under treatment, 22 under observation (last week 548 and 33 respectively); scarlet fever, 2004; diphtheria, 2471; enteric fever, 33; measles, 965; whooping-cough, 60; puerperal fever, 26 (plus 18 babies); encephalitis lethargica, 119; poliomyelitis, 1; "other diseases" 21. At St. Margaret's Hospital there were 18 babies (plus 9 mothers) with ophthalmia neonatorum.

Deaths.—In the aggregate of great towns, including London, there was no death from small-pox, 1 (0) from enteric fever, 99 (42) from measles, 9 (3) from scarlet fever, 27 (3) from whooping-cough, 49 (16) from diphtheria, 45 (7) from diarrhœa and enteritis under two years, and 33 (5) from influenza. The figures in parentheses are those for London itself.

The fatal case of enteric fever outside London was reported from Birmingham. Fatal cases of measles have dropped below the hundred line for the first time for many weeks: Southampton reported 7, Warrington, Salford, and Rochdale each 4. Birmingham and Liverpool each reported 4 fatal cases of whooping-cough. Six deaths from diphtheria occurred at Liverpool, 4 at Cardiff. Diarrhœa was credited with 6 deaths at Manchester and 4 at Liverpool.

The number of stillbirths notified during the week was 292 (corresponding to a rate of 39 per 1000 births), including 56 in London.

DEATH FROM SMALL-POX.

THE death assigned to Finsbury (Met. Boro.) in the Registrar-General's return for the week ended April 26th was that of a male infant, one month of age, who died at Joyce Green Hospital on April 2nd, the death certificate being filled in thus: Small-pox: pyæmia. Not vaccinated until after exposure to infection. No P.M. The father, Dr. A. E. Thomas tells us, was a commercial traveller, and the infant was sent into hospital with his mother, who had had small-pox for some time undetected. The mother's rash appeared on forehead and wrists on March 18th. On the 28th mother and child were removed to the South Wharf Hospital, and from there to Joyce Green. The baby was being breast-fed throughout and was vaccinated on the day of removal to hospital when he showed no signs of small-pox. These developed after admission to hospital. He was presumably infected by the mother prior to admission.

Correspondence.

"Audi alteram partem."

VITAMIN A AND INFECTIONS.

To the Editor of THE LANCET.

SIR,—I wish to express my concurrence with the views expressed by Dr. A. H. G. Burton and Dr. A. R. Balmain in their paper published in THE LANCET of May 17th (p. 1063) that vitamin A has no anti-infective effect in the sense of Mellanby and Green—namely, that it cannot prevent such an infection as puerperal septicæmia, nor can it cure such a septicæmia once it has been established. The experimental evidence is entirely in agreement with their clinical observations. Since previous observations have not been fully taken into account in the papers by Green and Mellanby, it may be useful to summarise the outstanding facts.

1. Animals kept on a vitamin A deficient diet are particularly susceptible to develop spontaneously infections of a chronic nature by organisms which are not very virulent.

2. The organs which are earliest and most frequently infected are the lungs and intestine (McCarrison,[1] Cramer[2]).

3. In the mucous membranes of these organs it has been shown that there is an atrophy of the mucous secreting cells and that the intestinal bacteria penetrate into the lumen of the glands of the altered intestinal mucous membrane, where they proliferate. Figures illustrating this process have been published in your columns.[2]

4. Animals kept on a vitamin A deficient diet do not differ in their immunological reactions from normal animals nor are they more susceptible to infection by virulent or avirulent pathogenic organisms, when these are introduced experimentally by subcutaneous injection (Cramer and Kingsbury[3]).

From these observations it seems justifiable to conclude that an adequate supply of vitamin A is necessary to maintain the mucous membranes in a state of full physiological activity, one of their functions being to prevent the bacteria normally inhabiting the lumen of the respiratory and intestinal tracts from penetrating into the body. A deficient supply of vitamin A impairs the functional activity of the mucous membranes with the result that the bacteria are allowed to penetrate into the mucous membranes to proliferate there and to produce a toxæmia. From there they may eventually penetrate into the blood stream, and after having exhausted the humoral defences of the body, set up metastatic infections elsewhere.

An adequate supply of vitamin A is therefore a powerful physiological prophylactic against infections entering by the mucous membranes. It may possibly be of therapeutic value also in the treatment of some chronic intestinal toxæmias and of chronic infections of the respiratory and intestinal tracts, especially where these have been associated with defective nutrition. But that has yet to be demonstrated. There is no evidence, however, that vitamin A can cure infections once the barrier of the mucous membranes has been passed or that it can prevent or cure those infections which enter by the blood stream or by the subcutaneous tissues, as they do, for instance, in puerperal septicæmia. To call vitamin A an "anti-infective" vitamin is as much a misnomer as to call it a "growth promoting" vitamin. It seems unwise to exaggerate the extent of its real action and to make claims for it which cannot be realised. Disappointment is sure to follow. This will discredit the more limited though really effective action of vitamin A of

[1] McCarrison, R.: THE LANCET, 1922, i., 208; and numerous other publications.

[2] Cramer, W.: THE LANCET, 1923, i., 1046; ibidem, 1924, i., 663.

[3] Cramer, W., and Kingsbury, A. N.: Brit. Jour. Exp. Path., 1924, vi., 300.

maintaining the physiological defences of the mucous membranes, which are the portals of entry of most infections in man.

I am, Sir, yours faithfully,
W. CRAMER.

Imperial Cancer Research Fund, London, May 17th, 1930.

ANGINA PECTORIS AND CORONARY DISEASE.

To the Editor of THE LANCET.

SIR,—I am grateful to Dr. Poulton for referring me to his Oliver-Sharpey lectures on visceral pain. I had forgotten that in them he dealt with angina pectoris, and I must apologise for criticising his theory of myocardial distension without reference to the whole of the evidence he adduces in its favour. I have now re-read his lectures carefully and with great interest.

In his letter he protests against my regarding myocardial anoxæmia as an alternate explanation to myocardial exhaustion or myocardial distension. I am unrepentant. It is only a half-truth to say that the heart muscle is exhausted in angina pectoris, but to say that the heart muscle is distended is to go far beyond the available evidence. The theory of myocardial anoxæmia offers a half-way house where the cautious student may, for the moment, rest, satisfied that he will not have to retrace his steps. I am, of course, aware that this theory provides no explanation of the actual pain mechanism, and I made no attempt to deal with this part of the subject in my article.

As for my objections (*a*) and (*b*). Dr. Poulton himself characterises the evidence in support of his theory as scanty and I have no desire to use a harsher adjective. I think that all the facts he gives in his lectures might be used to support a contrary theory. Take, for example, the case of acute left-sided failure which he and Dr. Campbell so ingeniously investigated. Dr. Poulton believes that the pain was due to stretching of the pain nerve-endings in the right side of the heart. It might equally well have been caused by raised tension in the left side of the heart owing to an inadequate relaxation of the muscle in spite of increased diastolic pressure or by raised tension in the right side due to exaggerated muscular contraction again with increased diastolic pressure. My own opinion (for what it is worth) is that the pain of angina is produced by an anoxæmia of the myocardium which results both in failure of the muscle-fibres to relax adequately and in exaggerated muscular contractions with consequent raised tension and stimulation of pain nerve-endings. Dr. Poulton's theory is, I believe, the correct one for other types of cardiac pain. It is interesting to observe that all these three factors—anoxæmia, imperfect relaxation (retraction), and exaggerated contractions are present in uterine pain in labour, but not in the painless contractions of pregnancy.

Objection (*c*). I was not aware of Dr. Anrep's work on amyl nitrite; I hope he will publish it so that it may be confirmed by the pharmacologists. It is unfortunate that neither Dr. Poulton nor I can be certain either of the clinical or of the experimental action of nitrite; if we could it would settle these problems.

Objection (*d*). Here Dr. Poulton misunderstands me, and probably it is my fault. When I wrote that there is no condition occurring in the stomach or œsophagus which is at all comparable to angina pectoris I was thinking only of primary angina pectoris, and I meant that there is no known syndrome in these organs in which there is clinically pain referred to the appropriate segments and pathologically, decay of the arteries supplying them. Now when one considers the difference in function between the heart and the gut would one expect to find such a syndrome.

The viscero-sensory reflex which, after Mackenzie, is best called secondary angina, may be initiated in the higher level of the brain, as in the neurasthenic, or in the lower level of the brain, as in the so-called "vaso-vagal" attacks which occasionally occur in epilepsy, or in any organ in which there is a septic or toxic factor, as in Mackenzie's well-known case of bladder abscess, or in the œsophagus and stomach as Dr. Verdon has stressed, but in none of these organs is there a condition occurring which is at all comparable to the condition of the heart in primary angina pectoris. As Dr. Poulton says, it is often difficult enough to differentiate between primary and secondary angina pectoris, but the attempt must be made both clinically and in a discussion such as this.

I am, Sir, yours faithfully,
Derby, May 19th, 1930. DOUGLAS HUBBLE.

COMPLEMENT FIXATION IN GONORRHŒA.

To the Editor of THE LANCET.

SIR,—May I be permitted to break a lance with Dr. A. Knyvett Gordon? In your issue of May 3rd (p. 965) he is reported as saying to the Medico-Legal Society that: "The complement-fixation test .... gave a positive result in only 40 per cent. of cases of true gonorrhœa, and sometimes a false 'positive' was obtained. He did not now perform this test." Other workers have found a much higher percentage in all but early cases, varying from 60 per cent. in uncomplicated cases to nearly 90 in those with complications. Moreover, in a series of 5000 tests Dr. J. O. Oliver and I found the percentage of false positives as low as 0·6. It seems a pity to decry a reaction which may frequently be very helpful and which appears to be highly specific.

I am, Sir, yours faithfully,
T. E. OSMOND.

St. Thomas's Hospital, S.E., May 19th, 1930.

UNDULANT FEVERS OF DOUBTFUL ORIGIN.

To the Editor of THE LANCET.

SIR,—May I warn my colleagues in general practice of the prevalence of a type of fever which must be new to most of us? It has been discussed in your columns and the Ministry of Health has issued an excellent report by Dr. Dalrymple Champneys, but I find that its existence is generally not known to those whose attention does not chance to have been directed to it by some fortunate accident—in my own case by the conversation of a friend in the veterinary profession. This fever, which is due to an organism known as *Bacillus abortus*, has long been known as causing epidemic abortion in cattle, pigs, and other livestock. Epidemic abortion is not a convenient term for use with our patients but we may take advantage of the close relationship between *B. abortus* and *M. melitensis* to call our cases undulant fever.

I have one such case under my care at the moment and the blood agglutinates *B. abortus* in 1 in 10,240 (Dr. A. B. Rosher). On making inquiries I discovered three other cases under the care of colleagues, who kindly permitted me to see them. Their blood reactions were negative, but they were clinically undulant fever. As I am informed that cattle from which the organism can be recovered by no means always give the reaction, these negative laboratory results do not worry me. I have heard of two other cases not in this district and have seen the chart of one. It was typical. I have also called to mind (which I should have done sooner) two cases in this district in which agglutination was positive. One of these was fatal. These two cases occurred about a year ago. It seems fair to describe this disease as prevalent.

The onset of the attack is rather acute and is often accompanied by profuse sweating—a good diagnostic point. Fever ranges to about 102° or 103° F. and after a week or so tends to rule somewhat lower.

There follows another short period of higher temperatures, and this alternation continues with a steady downward trend for as many as eight or nine weeks or more. During this time the possibility of typhoid, paratyphoid, or tuberculosis, inevitably occurs to the mind.

In the cases which I have seen there was no common milk-supply nor (as is sometimes the case) any history of contact with infected pigs or cattle. The disease is rampant amongst cattle all over the country, but its restricted prevalence amongst human beings suggests that milk is not the vehicle of infection.

I am, Sir, yours faithfully,

Sevenoaks, Kent, May 15th, 1930. GORDON WARD.

Obituary.

CHARLES EDWARD WALLACE BELL, M.R.C.S. ENG.

THE death of Mr. C. E. Bell on May 13th, at the age of 77, removes a man who played a prominent part in the medical life of Exeter for many years. The youngest son of the Rev. F. Bell, an honorary canon of Truro Cathedral, he began his professional career in Exeter in 1871 as a pupil of Dr. John Woodman at the Royal Devon and Exeter Hospital. In 1876 he was appointed honorary surgeon to the Exeter Dispensary, and ten years later was elected consulting surgeon to that institution. He was its president in 1927, and a member of its committee at the time of his death. In 1888 he was elected surgeon to the Royal Devon and Exeter Hospital, and retired from the active surgical staff in 1916, being then appointed consulting surgeon and an honorary life governor in appreciation of his long service. At the time of his resignation from the active staff he was chairman of the hospital's nursing committee, and remained in that office till 1929. Of other public work it may be mentioned that for many years he was surgeon to the Exeter city police force. During the last part of his life, when he had retired from active practice, the hospital remained Mr. Bell's paramount interest, and he was a scrupulously regular attendant at the weekly board meetings—apart from his work on the nursing committee, in which he took an especial pride. Strong in his convictions, and throughout his lifetime outspoken and critical in his views, he certainly did not court popularity; and though jealous of the prestige of his profession and able to speak with a weight of long experience behind him in matters of medical policy, in his later years he sometimes found himself opposed to the views of his younger colleagues. He therefore tended to become a somewhat solitary figure, especially as Mrs. Bell died many years before him.

Bell was well known locally as a violinist, and music was his chief hobby. His wife was an accomplished pianist and violinist, and during her lifetime many off-duty hours were devoted almost daily to chamber music at home with their friends. For years, moreover, he was the able leader of the first violins in the Western Counties Oratorio, and other local musical societies. He had been in his younger days a good cricketer and Association footballer, and up to the last year or so made a point of supporting Exeter cricket and Association football clubs, and of attending their matches. He had no children.

THE LATE PROF. YAMAGIWA.

Dr. W. Cramer sends the following notes concerning the late Prof. Yamagiwa, whose death we recorded in an annotation last week:—"Yamagiwa's first publications dealt with problems of general pathology, such as inflammation and regeneration of tendons. He also published in 1900 a paper on beri-beri, Beiträge zur Kenntnis der Kakke, *Virch. Arch.*, vol. clvi. After a detailed description of the pathological changes found in patients who had died from the disease, he discussed its ætiology. He showed that the condition is not contagious, and cannot be due to a pathogenic organism. He came to the conclusion that it is due to poisoning by food, and that it can be prevented by altering the diet. The article of diet which he incriminated was "bad rice." The cancer problem then attracted his attention, and in 1905 he published a monograph in Japanese entitled the Histogenesis and Pathogenesis of Cancer of the Stomach. This was followed in 1911 by a paper on Primary Carcinoma of the Liver, *Virch. Arch.*, vol. ccvi., and at a meeting of the Japanese Pathological Society he communicated a paper on the Influence of Heredity on the Incidence of Cancer in Man. In his monograph on gastric cancer he established the following principles: 'For the development of carcinoma, each organ has its own history and its own causation. . . . There are no inborn cancer cells and no specific cancer germs.' In 1915 he published, with his assistant Ichikawa, his classical paper entitled Experimentelle Studien über die Pathogenese der Epithelialgeschwülste, Gewidmet unserem, grossen, lange verewigten, Lehrer, Rudolf Virchow, aus Dankbarkeit.

"When, in 1918, two American authors questioned the true malignant nature of the tumours produced by painting with tar over a long period, without having themselves repeated the experiments, Yamagiwa simply replied in a later paper: 'If they do not believe our results they should apply tar to the ear of rabbits with the same patience as we have done, in experiments lasting for months and even years.' The results were soon confirmed by Tsutsui, a pupil of Yamagiwa, who produced cancer in the skin of mice by tar-painting, and they were established as an experimental method by Fibiger, and by Murray and Woglom, who carried out experiments on a large scale. The advantage of the method discovered by Yamagiwa over Fibiger's experiment consisted in the fact that cancer could now be produced in an accessible site, and that all the stages of carcinogenesis could be studied with relative ease. Yamagiwa himself continued his investigations and succeeded in producing in rabbits cancer of the mamma by the injection of tar suspensions into the mammary region.

"It is impossible to over-estimate the importance of Yamagiwa's discovery for the study of cancer. It is not merely that it placed the doctrine of chronic irritation as a cause of cancer on a sound experimental basis, while before it had merely been one of many different theories advanced as an explanation. It also provided cancer research with a method which has given a new impetus to the investigation of the disease, and which, even within the few years which have elapsed since it has been adopted, has enormously increased our knowledge of some of the most obscure and baffling problems of cancer."

FOOTBALL COMPETITIONS FOR HOSPITALS. — The Glasgow Charity Football Club competition this year produced £4666, which has been distributed among local hospitals and similar institutions. Since the competition was begun in 1877 it has provided over £100,000 for these purposes.

PROGRESS OF CONTRIBUTORY FUNDS.—At the annual meeting at Southport last week in connexion with the London, Midland and Scottish Railway Hospital Fund it was reported that the contributions from the members of the staff, numbering approximately 240,000, amounted last year to £141,317, as compared with £100,640 in 1928; the increase was mainly due to the higher rate of the weekly contributions. The total receipts were £189,410. The amount paid to hospitals and kindred institutions was £120,405; railway convalescent homes received £21,994.—The latest figures show that more than 86 per cent. of the gas-workers in South London are members of the Hospital Saving Association. The South Metropolitan Gas Company's group, which has 7709 contributors, is one of the largest subscribing units in the country.—Last year the contributory scheme at the Hampshire County Hospital increased its membership by 2000 to 32,000, its branches to 293, and its income to a little over £11,000.

Parliamentary Intelligence.

NOTES ON CURRENT TOPICS.

MENTAL TREATMENT BILL.

REPORTED TO THE HOUSE OF COMMONS AND PASSED.

THE House resumed, on Wednesday, May 14th, consideration of the Mental Treatment Bill as amended in the Standing Committee.

Voluntary Patients.

Clause 2 deals with the reception, death, and discharge of voluntary patients. Subsection (3) provides that:—

If any person received as aforesaid becomes at any time incapable of expressing himself as willing or unwilling to continue to receive treatment, he shall not thereafter be retained as a voluntary patient for a longer period than one month, and shall, if he has not been previously discharged, be discharged on the expiration of one month from the date on which he became incapable of so expressing himself, unless in the meantime he has again became capable of so expressing himself, or steps have been taken to deal with him either under the principal Act as a person of unsound mind or under Section 5 of this Act as a person who is likely to benefit by temporary treatment.

Colonel WEDGWOOD moved to omit all the words after the words "so expressing himself." He said that this amendment raised the whole question of Clause 5 which provided for temporary treatment without certification. Under Clause 5 doctors would have an opportunity of getting their patients into an asylum without feeling that they were condemning them to long segregation. Therefore doctors being merely human beings would naturally select the more humane way, and gradually there would be more and more people sent to mental hospitals, not because they were certified in a way which would involve risks to the doctors, but because they entered first as voluntary patients and then became temporary patients. He wanted to prevent people who entered as voluntary patients being liable on that account to be suddenly converted into temporary patients. If the Government really had the interests of patients at heart they should accept the amendment.

Mr. ERNEST WINTERTON seconded the amendment.

After further debate,

Miss SUSAN LAWRENCE (Parliamentary Secretary to the Ministry of Health) said that they were dealing with the case of a patient who feared that he was losing his reason, and then unfortunately actually did so. He then became either incapable of expressing himself, or he became insane. Such cases not improbably might arise. Very often persons who were subject to mental disease knew quite well that they were in danger, and a patient in that condition who was told that voluntary treatment might avert the attack entered as a voluntary patient. But his hopes might not be realised, and he might become either incapable of volition or insane but with volition, though of a misguided nature. Such a person could not remain as a voluntary patient, for the whole essence of the Bill was that voluntary treatment should only be given to those who expressed a wish for it. Something must be done for that kind of patient. In his own interests, and in the interests of the community, he must have care appropriate to his condition. The person in charge was directed in that case to take steps so that the patient might be dealt with under Clause 5. If certified the person would have the usual safeguards of the Lunacy Act, the two doctors and the magistrate, while if he came under Clause 5 the opinions of two doctors were necessary, the relatives had to be informed, and there would be all the safeguards provided in Clause 5 in the case where a person became incapable of volition while a voluntary patient. This amendment was based on a complete misunderstanding of the Bill.

Dr. VERNON DAVIES said that in the majority of these cases the patients were taken away by the relatives, so that there was no possibility of a patient being illegally detained beyond a day or two. The amendment was not only unnecessary but it was dangerous, and he was certain that the Government would not accept it.

Dr. MORRIS-JONES said that this matter had been very carefully examined by the Royal Commission, and he thought that Colonel Wedgwood was unduly alarmed about the clause. Investigations had proved that there had been no illegal detentions. Safeguards were provided, and there was no other alternative but to adopt the clause as it stood.

After further debate the amendment was rejected by 241 votes to 106.

Minor Amendments Accepted.

On Clause 4 (power to lodge relatives and friends of patients),

Mr. GREENWOOD (Minister of Health) moved an amendment providing that relatives or friends of patients lodged in a hospital or licensed house should not be reckoned as patients if they were lodged in a part of the premises not permitted to be used for the accommodation of patients.

The amendment was agreed to.

On Clause 5 (provision for temporary treatment without certification of certain persons),

Colonel WEDGWOOD moved an addition to the clause providing that the Board of Control should upon the signed request of any person who considered himself to be unjustly detained under an application, recommendation, or order, furnish him, or his authorised representative, with a copy of the document.

Mr. GREENWOOD accepted the amendment, which was agreed to.

The Pauper Stigma.

Mr. WINTERTON moved to insert at the end of Subsection (14) the following proviso:—

(*a*) Section 6 of the Luancy Act, 1890, shall apply to all pauper patients;

(*b*) any person appointed by the patient to be present at the consideration of the petition under Subsection (3) of Section 6 of the Lunacy Act, 1890, shall have the right to make representations on behalf of the patient.

He said the purpose of the amendment was to give rate-aided patients exactly the same privileges as were enjoyed by private patients.

Mr. C. WILLIAMS seconded the amendment.

Mr. GREENWOOD said he had explained on the second reading that it was not possible in this Bill to do what was asked in this amendment, because he wanted to achieve the maximum of accomplishment with the minimum of controversy. He trembled to think what he would have had to face if he had done otherwise. He would remind Mr. Winterton that in this Bill they were getting rid of the pauper stigma. Was that nothing? The next big thing which they were doing was to make it possible for people who had hitherto had no other form of treatment than that which followed certification to get the same treatment which the well-to-do were receiving. He was not opposed to the amendment, but his objection to it was that if it were adopted, with all the necessary consequential amendments, they would never get the Bill through.

The amendment was withdrawn.

Board of Control: Unpaid Commissioners.

On Clause 11 (Reorganisation of the Board of Control),

Lieut.-Colonel FREMANTLE moved an amendment to provide that on the Board there should be two unpaid Commissioners of whom one should be a layman and the other a laywoman. He said that the unpaid Commissioners on the Board at the present moment were reckoned to be doing good work. He thought it was desirable that there should be still an unpaid unofficial element in order to bring the point of view of the ordinary man and woman into the working of the Board. Public confidence was far more likely to be given to the Board if there were unpaid members on it than if it were simply a body of paid officials.

Dr. VERNON DAVIES, in seconding the amendment, said that the addition of unpaid members would increase the status of the Board of Control and give a measure of confidence to the public that the lunacy laws were being administered in a fair and reasonable manner.

Mr. GREENWOOD said he could not accept the amendment. He was still of the opinion that the principle of appointing lay commissioners was foreign to the spirit of the Royal Commission's report. No one would persuade him that they would have an effective machine if it was composed partly of volunteers. There was no other department of the State to-day which placed heavy executive and administrative responsibilities on an honorary staff. Why then should it be done with regard to the Board of Control? This amendment, he believed, would be injurious to the interests of mental treatment, and he asked the House to reject it.

After further debate the amendment was rejected by 163 votes to 63.

Two Senior Commissioners to be Medical.

Lieut.-Colonel FREMANTLE moved an amendment to provide that two of the senior commissioners, other than the chairman, should be medical commissioners. He said the object of the amendment was to carry out a further proposal in the report of the Royal Commission. Looking at the work of the Board of Control it was quite clear that it was mainly legal and medical. So much was this the

case that the Royal Commission said it might be desirable to appoint two medical commissioners, one having experience of institutional administration, and the other possessing special scientific knowledge. They could not as a rule get one medical man who could fulfil both these qualifications.

Dr. VERNON DAVIES seconded the amendment.

Mr. GREENWOOD accepted the amendment, which was agreed to.

Status of Junior Commissioners.

Lieut.-Colonel FREMANTLE moved an amendment to provide that the paid commissioners, other than senior commissioners, should be appointed by His Majesty on the recommendation of the Board of Control. He said that this matter might be of only minor importance, but was it right that they should give an inferior status to those commissioners who were going to represent the Board of Control in inspecting mental institutions? They would be called upon to deal with men in the highest position in the profession who were the heads of these institutions, and it would make all the difference in the world if the visiting commissioners had the highest possible status.

Mr WOMERSLEY seconded the amendment.

Miss LAWRENCE contended that it was right that they should mark a difference in status between the senior and junior commissioners. It was not generally the practice to appoint the junior officers in the civil service on the appointment of His Majesty. That was a form reserved for the very highest class. It was therefore quite unusual and quite unnecessary that the officials who acted in the main as inspectors of the Board of Control should have this especial mark of appointment by the Crown.

The amendment was negatived.

Miss LAWRENCE moved an amendment to provide that the junior commissioners should include women as well as men.

The amendment was agreed to.

Proceedings against Doctors.

On Clause 16 (which amends Section 330 of the principal Act),

Miss LAWRENCE moved the omission of the second subsection which deals with proceedings against doctors. She moved the substitution of the following subsections:—

(2) No proceedings, civil or criminal, shall be brought against any person in any court in respect of any such matter as is mentioned in the last preceding subsection, without the leave of the High Court, and leave shall not be given unless the court is satisfied that there is substantial ground for the contention that the person, against whom it is sought to bring the proceedings, has acted in bad faith or without reasonable care. (3) Notice of any application under the last preceding subsection shall be given to the person against whom it is sought to bring the proceedings, and that person shall be entitled to be heard against the application. (4) Where on an application under this section leave is given to bring any proceeding, and the proceedings are commenced within four weeks after the date on which leave was so given, the proceedings shall for the purposes of the Public Authorities Protection Act, 1893, be deemed to have been commenced on the date on which notice of the application was given to the person against whom the proceedings are to be brought.

She said it would be remembered that the Royal Commission pointed out that the protection allowed by law to medical men against whom proceedings were taken was not sufficient, and that many doctors would not sign certificates on account of the difficulties in which they might be landed. The Government resolved to carry out the recommendations of the Royal Commission, and inserted a form of words which was discussed in Committee. As a result of that discussion the Minister of Health promised to meet some of the difficulties and objections raised. The Government had very considerably amended the original clause which provided that a doctor was obliged to apply to the judge for a stay of proceedings. In this new clause proceedings might be conducted in a more appropriate way. Before an action began a judge had to be satisfied that there was substantial ground for it. Many people who had undergone treatment had been discharged partially cured, and they were unfortunately very likely to take legal proceedings. Dr. Hastings in the second reading discussion had said that there were two classes of insane people, and one of them included those people who never believed anyone, and who bore a grudge against everyone. It was quite likely that there might be a mass of baseless actions against doctors, and the Government had provided that leave must be given for the initiation of such proceedings against a medical practitioner. She hoped that in its new form the clause would meet the apprehensions expressed by hon. Members.

The amendment was agreed to.

Conflicting Views.

On the motion for the third reading,

Sir B. MERRIMAN said it was an outrage that the third reading of this Bill should be taken at 4 o'clock in the morning. He did not know whether the House realised that they had passed a clause which almost as an isolated instance deprived a whole class of persons of their right to bring an action.

Dr. DAVIES said he would like to corroborate the remarks of Sir B. Merriman. They were passing a Bill that would affect thousands of people, but they were passing it with a minimum of discussion and a maximum of forced closure. They had not been able to do justice either to themselves or to the people whom they represented. There were many provisions in the Bill which he was perfectly certain would not act as the House wanted them to act. The Bill was going to be detrimental to the treatment of mental disease. It would prevent some people submitting themselves for treatment as early as they should do. The obstinacy of the Minister of Health in refusing to accept changes with regard to the Board of Control would also have a detrimental affect. The responsibility was upon every Member who had forced this Bill through without discussion and without regard for the advice of men who knew what they were talking about. The Labour party jeered at the medical profession, and imputed to them unworthy motives. They did not recognise that the health of the country was in the hands of the medical profession, and that public opinion regarding medical men was not improved by constant ill-informed criticism.

Mr. WINTERTON said of all the people who had the right to complain surely the medical profession had the least. This Bill would probably have never seen the light except for the demand of the medical profession that they should be relieved of certain obligations which most other professions were willing to accept. If he felt that the patients who would come for treatment under this Bill were as secure as the doctors, he would feel a great deal happier.

Dr. MORRIS-JONES said he thought this Bill was a very excellent Bill, and he congratulated the Minister of Health on getting it through. It was a great charter for the poor, who for the first time were given as good a chance as the rich. He could not agree with Mr. Winterton in regard to the privileges accorded to the medical profession. He (Dr. Morris-Jones) emphatically denied that there was anything in the Bill that conferred any privileges on the medical profession.

The Bill was read the third time and passed.

HOUSE OF LORDS.

THURSDAY, MAY 15TH.

WORKMEN'S COMPENSATION (SILICOSIS) BILL.

The Workmen's Compensation (Silicosis) Bill was read the third time.

HOUSE OF COMMONS.

WEDNESDAY, MAY 14TH.

Leprosy in the Sudan.

Lieut.-Colonel FREMANTLE asked the Secretary of State for Foreign Affairs if his attention had been drawn to a recent report by the medical secretary of the British Empire Leprosy Relief Association on his visit to the Sudan to the effect that advanced and infectious cases of leprosy were prevalent, that the disease was spreading into British East African territories from the Belgian Congo, that at Yubo as many as 23 per cent. of contacts acquired the disease, and that further spread of the disease could only be arrested by active and enthusiastic development of technical education and administrative action with the concurrence of native opinion, which was well disposed to it, by both missionary and Government agencies under skilled supervision; and what action he proposed to take in the matter.—Mr. DALTON (Under Secretary for Foreign Affairs) replied: No, Sir. I have not as yet seen a copy of the report to which the hon. Member refers. I will, however, draw the attention of the Government of the Sudan to it. I understand that Dr. Cochrane, secretary of the British Empire Leprosy Relief Association, recently visited the leper colonies at Wau, Tembura, and Yambio, and discussed the position with the officials of the Sudan Government.

THURSDAY, MAY 15TH.

Miners and Fibrosis of the Lungs.

Mr. HOPKIN asked the Home Secretary if his attention had been drawn to the work done at the Beck Laboratory, Swansea, in the investigation of the causes of fibrosis of the lungs of miners in the anthracite district; and, in view of such work, was he prepared to extend this work so that the staff might give more time to research work in this matter.—Mr. CLYNES replied: I understand that the work

referred to in the question is being carried on as part of a scheme of research organised by Prof. Cummins, the director of the Welsh National Memorial Association. As my hon. friend is aware, the Medical Research Council has recently set up, at my request, an expert committee on industrial pulmonary diseases, whose duty it is to consider proposals for new inquiries or extending existing inquiries and make recommendations to the Council, and I will see that his suggestion is brought to the notice of this committee. I am informed that the Council have already made a grant for the expenses in connexion with the research at this laboratory.

Hospital Lotteries.

Mr. GREENE asked the Home Secretary whether, seeing that the present position of the law with regard to lotteries entailed loss to recognised charities such as hospitals, he would consider the revision of the law to the effect that those desiring to promote lotteries might apply to some authority, later to be designated, for permission to promote such lotteries under conditions, later to be laid down, such as that a certain percentage of the moneys to be received should be distributed to approved charities.—Mr. CLYNES replied: Proposals of this kind have been considered from time to time, and I recall that in 1918 a scheme was before this House but, though confined to registered war charities, was rejected by a small majority. I am not, as at present advised, prepared to take the initiative in reopening the question.

Supply of Quinine in India.

Major GRAHAM POLE asked the Secretary of State for India if he had received from the Government of India a report of the present position in regard to the cultivation of cinchona and the manufacture and distribution of quinine in India, and in regard to the policy of the Government of India in this matter, in view of the facts brought out in the statement of the director of botanical survey in India, in his report for 1928–29, that the poor in India were unable to purchase quinine at the price at which it was sold in India, and that charitable dispensaries had to turn malaria-stricken patients away empty or with inadequate doses.—Mr. WEDGWOOD BENN replied: I have not yet received the report in question, but from a report on the progress made in giving effect to the recommendations of the Royal Commission on Agriculture in India I see that the Government of India are in consultation with the provincial governments on the question of centralising the whole subject of cinchona cultivation and the manufacture and distribution of quinine, which according to the Royal Commission was the first step towards the reduction of the price of quinine in India to a level at which it would be possible to embark on an intensive antimalaria campaign.

TUESDAY, MAY 20TH.

Physically Defective School-children in Scotland.

Mr. TRAIN asked the Secretary of State for Scotland how many physically defective children were being conveyed to and from school in Lanarkshire; and how many other school-children were provided with transport facilities in Lanarkshire on account of the distance of the school from their homes.—Mr. ADAMSON replied: The number of physically defective children who are being conveyed to and from special schools by the education authority of Lanark is 602. In addition, 220 mentally defective and 24 deaf-mute pupils are being conveyed to and from such schools. The number of other pupils for whom conveyance facilities are provided is 2360.

EXTENSION OF BOURNEMOUTH HOSPITAL.—On Friday last week the Earl of Malmesbury, Provincial Grand Master of Hampshire and the Isle of Wight, laid the foundation-stone, with Masonic honours, of the new private wards and the extension of the specialist and out-patients' departments of the Royal Victoria and West Hants Hospital, Bournemouth. The enlargements include about 50 wards for paying patients, and when the work is completed £180,000 will have been expended on new accommodation within the last ten years.

BELGRAVE HOSPITAL FOR CHILDREN.—Last year the 2038 in-patients cost an average of £3 7*s.* 1*d.* per week (an increase of 7*s.* 5*d.* over four years ago). There were 16,247 new out-patients who cost 1*s.* 7½*d.* per attendance. There were over 69,000 attendances. The out-patients' department is seriously overcrowded and plans are being prepared for the erection of a new one which, with a nurses' home, will cost £60,000. A ward of 12 pay-beds is now available at a fee of £3 3*s.* per week plus the moderate fees of the medical staff graduated according to the circumstances of the parents.

Medical News.

UNIVERSITY OF OXFORD.—The electors of the George Herbert Hunt travelling scholarship have awarded the scholarship for 1930 to Ronald Graeme Macbeth, B.M.

UNIVERSITY OF CAMBRIDGE.—Mr. Stanley Baldwin has been elected Chancellor of the University in place of the late Lord Balfour.

At a congregation in June it is proposed to confer an honorary degree on Sir John Rose Bradford, F.R.S., President of the Royal College of Physicians of London.

On May 16th the following degrees were conferred:

M.B. & B.Chir.—J. V. Broad, E. C. Wynne-Edwards, and E. R. Keeble.

B.Chir.—L. J. Haydon.

ROYAL COLLEGE OF PHYSICIANS OF EDINBURGH.—Dr. W. S. Thayer, emeritus professor of medicine in the Johns Hopkins Hospital, Baltimore, will deliver the Gibson memorial lecture at the College at 5 P.M. on Tuesday and Wednesday, May 27th and 28th. His subject will be Endocarditis.

ROYAL COLLEGE OF SURGEONS OF EDINBURGH.—At a meeting of the College on May 15th, with Dr. James Haig Ferguson, the President, in the chair, the following 21 candidates (out of 68 entered) who passed the requisite examinations between Jan. 2nd and 10th of this year, were admitted to the Fellowship:—

Subbier Annaswami, Douglas James Brown, Ernest Joseph Burton, Alfred Bramwell Cook, Joseph Eli Erdheim, Mohammad Husnain, Frederick William Helmore, Keith Lindsay Hugh Kirkland, Douglas Alfred Langhorne, Shu Pui Li, James Craig McMaster, Cecil David Meadowcroft, Marjorie Murrell, James Purce, Aubrey David Dick Pye, Marion Aroha Radcliffe-Taylor, John Fletcher Robinson, John Bertrand De Cusance Morant Saunders, Alexander Brownlie Smith, Richard Fowler Ward, and David Wilkie.

R. V. P. Campbell, S. R. Woodcock, and Bartholomew Hair received the Higher Dental Diploma.

The Bathgate memorial prize was, after a competitive examination in materia medica, awarded to Mr. G. L. G. Major.

UNIVERSITY OF LONDON MEDICAL GRADUATES SOCIETY.—The annual meeting and dinner of this Society was held on May 13th, at the Langham Hotel, with Sir StClair Thomson, the President, in the chair. Replying to the toast of the guests, Dr. Edwin Deller, Principal of the university, said that for too long the university had been regarded by her graduates as a stony-hearted stepmother, who scrutinised them, examined them, took their fees, rejected them, re-examined them, passed them, and then cast them adrift to shift for themselves. He hoped that before long they would have a home of their own on the Bloomsbury site, which would help to draw the graduates together. The society was already helping to draw together the graduates of the biggest and greatest faculty. The toast of the society was proposed by Prof. G. E. Gask, who spoke of the high standard which it had always maintained in medicine. Mr. W. McAdam Eccles, in his reply, said that with over 4000 medical graduates of the university, the scope for the society was very great.

Sir John Rose Bradford, F.R.S., was elected President for the ensuing year.

A HOSPITAL EXHIBITION.—At the conference of the British Hospitals Association at Newcastle on June 18th, 19th, and 20th, there will be an exhibition of plans of recent hospital construction. There will also be an opportunity for firms to exhibit anything new in the way of fitments, furniture, and appliances, the only condition being that these have only recently been put on the market and are not too bulky. Firms wishing to exhibit are asked to communicate with Mr. S. Dunstan, House Governor and Secretary of the Royal Victoria Infirmary, Newcastle-upon-Tyne.

GERMAN PHARMACOLOGICAL SOCIETY.—The annual meeting of this society will be held in Königsberg from Sept. 4th to 7th, to discuss problems of the general reaction of the organism from the pharmacological standpoint. The subject will be introduced from four points of view by (1) Starkenstein (Prague), Problems of Inflammation; (2) Freund (Münster), Problems of Febrile Diseases; (3) Storm van Leeuwen (Leiden), Allergy; (4) Schulemann (Elberfeld), Problems of Reticulo-endothelium and its Functions. Any who wish to take part are asked to communicate before July 10th with the president of the society, Prof. J. Schüller, Pharmacological Institute, Zülpicherstrasse 47, Cologne, or with the business manager, Prof. Lipschitz, Pharmacological Institute, Weigertstrasse 3, Frankfurt a.M.

UNIVERSITY OF ABERDEEN.—Sir Arthur Keith, F.R.S., conservator of the Museum of the Royal College of Surgeons of England, has been invited to stand as independent (non-political) candidate for the Rectorship of the University in succession to Lord Birkenhead.

CHILD GUIDANCE COUNCIL.—This Council has changed its address to 7, Buckingham Palace-gardens, London, S.W. 1. (Tel.: Sloane 9021.)

POST-GRADUATE COURSE AT CARLSBAD.—An international medical course, with special reference to balneology, will be held again this year at Carlsbad, Czechoslovakia, from Sept. 14th to 30th. Particulars may be had from Dr. Edgar Ganz at Carlsbad.

CENTRAL BUREAU OF HOSPITAL INFORMATION.—The address of this office will in future be 12, Grosvenor-crescent, London, S.W.1. (Tel.: Sloane 7136.) This is also the new address of the Joint Council of the Order of St. John and the British Red Cross Society.

JEWISH HEALTH ORGANISATION OF GREAT BRITAIN. On Sunday, May 25th, at 3.15 P.M., Sir Humphry Rolleston will take the chair at a symposium on the Physical and Mental Aspects of the Jew. The meeting will be held at Conway Hall, Red Lion-square, London, W.C., and the speakers will be Prof. M. Ginsberg, Dr. L. Isserlis, Dr. W. M. Feldman, and Dr. E. Miller. The address of the secretary is 19, Dorset-square, N.W. 1.

RESEARCH DEFENCE SOCIETY.—The annual general meeting of the society will be held at the House of the Medical Society of London, 11, Chandos-street, Cavendish-square, W. 1, on Tuesday, June 3rd, at 3.15 P.M. The chair will be taken by the President of the society, Lord Lamington, and a lantern lecture will be delivered by Mrs. E. Mellanby on Diet and Dental Disease. The lecture, the Fourth Stephen Paget Memorial Lecture, will illustrate the lessons learned from animal experiments.

DONATIONS AND BEQUESTS.—The late Miss Sarah Caroline Brand, of Stone House, Ickleton, Cambs, among other bequests left £1000 to Addenbrooke's Hospital, Cambridge, for the endowment of a bed in her name, and £1000 for the endowment of two cots in the name of her sister, Mary Jones Brand; £500 to St. Dunstan's Hostel for Blinded Sailors and Soldiers, and £100 each to the National Institute for the Blind and Dr. Barnardo's Homes.

LADIES' MEDICAL GOLFING SOCIETY.—The spring meeting was held at Ashford Manor Golf Club on May 20th, under pleasant conditions, and was well attended. The prize-winners were as follows:—Canny Ryall Cup: Mrs. A. C. Palmer, 95 – 21 = 74. Scratch prize: Mrs. H. Guedalla, 82. Best net scores under handicap, 1st Division: Mrs. Grange Harrison, 77; Mrs. Roberts Harris, 78. 2nd Division: Mrs. J. S. Burn, 77; Mrs. Hopkins, 77. 3rd Division: Mrs. Massey, 74; Mrs. Norwood Brown, 81. Bogey Greensomes: Mrs. Lewis Smith and Dr. M. H. Kettle, 5 up; Lady Ryall and Mrs. Russell-Smith, 4 up.

CHARING CROSS HOSPITAL: AN AMERICAN WING.—A wing, endowed by American subscriptions, is shortly to be opened at Charing Cross Hospital. Upon the exterior will be placed the inscription, "Columbia Wing. Endowed by the generosity of American citizens." The largest subscriber to the wing, which will consist of two wards of 20 beds, is Mr. E. Stephen Harkness, of New York, who has given £5000. A further £15,000 is, however, still needed.

JEWISH HOSPITAL.—Last year this hospital, at Stepney Green, completed its first decade of full work—it began in a small way as an out-patient department only. During the year 1531 in-patients were treated at an average weekly cost of £3 2*s.* 7*d.*, a reduction of 4*s.* 5*d.* It is hoped that Jewish patients may, to a large extent, be centralised by the London County Council in one of the East End municipal hospitals. This would enable the Jewish Hospital to transfer cases of chronic disease and others unsuitable for treatment within its walls.

INSURANCE AGAINST MISTAKEN DIAGNOSIS.—Westminster City Council has followed the lead of Stoke Newington (see THE LANCET, March 22nd, p. 636) in insuring its officers against claims arising out of errors in diagnosis, in view of the prevalence of small-pox and the notorious difficulties in its differentiation. The Westminster Health Committee has obtained quotations from insurance companies and recommends the council to insure its medical officer of health against such risks. Nine boroughs in London have now taken out such policies, and ten others are considering the advisability of so doing.

BRITISH SOCIAL HYGIENE COUNCIL.—The Marquess of Linlithgow has resigned the office of President of this Council and Sir Basil Blackett is to succeed him.

A MEDICAL FREEMAN.—Dr. George Harrison, J.P., has been elected a freeman of the city of Chester. His great-grandfather and grandfather and his two paternal uncles, all of whom were medical practitioners, received the same honour.

MATERNITY CASES AT SHEFFIELD.—The basis of admission to the Nether Edge Hospital has been altered pursuant to a recommendation of a special sub-committee of the Sheffield city council. In future admission to the maternity blocks is to be on the basis of home conditions, plus medical and surgical need; decisions in regard to admission are to rest with the surgical staff, and the facts relating to the financial position of patients are to be obtained by the health visitors' staff for the use of the almoner, when appointed.

LEICESTER ROYAL INFIRMARY.—This hospital last year received 7107 in-patients and 13,564 out-patients; the casualties numbered 19,523, and the income was £85,870, leaving a deficit of £764, which brings the accumulated deficits up to £16,000. There was a considerable reduction in the number of motor-car patients, but a substantial increase in patients injured in pedal and motor-cycle accidents. The latter were more serious than the car accidents. Altogether, accidents cost the hospital nearly £11,000. The average cost per occupied bed was £158.

Medical Diary.

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

TUESDAY, May 27th.—5 P.M., MEDICINE. Election of Officers and Council.

WEDNESDAY.—5 P.M., COMPARATIVE MEDICINE. Election of Officers and Council. Short Papers: Dr. J. A. Arkwright: Note on a Few Cases of "Show Fever" in Cats. Dr. R. T. Leiper: Demonstration of Helminthological Preparations. Dr. Tom Hare: A Case of Canine Verminous Bronchitis Due to Oslerus Osleri.

FRIDAY.—5 P.M., DISEASE IN CHILDREN. (Cases at 4.30 P.M.). Election of Officers and Council. Presidential Address: Mr. H. A. T. Fairbank: Some Remarks on Osteo-Genesis Imperfecta. Cases will be shown. ANÆSTHETICS. Dinner of the Section at the Adelaide Galleries, King William-street, Strand, W.C., at 7.45 P.M.

MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASE, 11, Chandos-street, Cavendish-square, W.

FRIDAY, May 30th.—8.30 P.M., Dr. D. N. Nabarro: Paper on Some Pitfalls in the Diagnosis and Treatment of Congenital Syphilis. A discussion will follow.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION 1, Wimpole-street, W.

MONDAY, May 26th to SATURDAY, May 31st.—MILLER GENERAL HOSPITAL, Greenwich, S.E. Mon., 2 P.M., Dr. E. C. Warner (Selected cases—children), clinical demonstration. No fee. Fri., 2 P.M., Demonstrations by Mr. Arthur Gray (Gynæcological operations) No fee.—MEDICAL SOCIETY OF LONDON, 11, Chandos-street, Cavendish-square, W. Special M.R.C.P. lectures by Dr. B. T. Parsons-Smith. Tues. 8.30 P.M., Coronary Thrombosis. Fri., 8.30 P.M., Cardiac Failure.—HOSPITAL FOR SICK CHILDREN, Great Ormond-street, W.C. Special two weeks' course consisting of lectures, demonstrations, operations. Mornings only.—QUEEN MARY'S HOSPITAL, Stratford, E. Special all-day course in medicine, surgery, and the specialties with especial reference to tuberculosis. Two weeks.—Further particulars from the Fellowship of Medicine.

ST. MARY'S HOSPITAL INSTITUTE OF PATHOLOGY, W.

THURSDAY, May 29th.—5 P.M., Sir Thomas Lewis: Reactions of the Skin to Cold.

CITY OF LONDON MATERNITY HOSPITAL, City-road, E.C.

TUESDAY, May 27th.—5 P.M., Dr. H. Burt-White: Investigation and Treatment of Puerpural Pyrexia.

WEST LONDON HOSPITAL POST-GRADUATE COLLEGE, Hammersmith, W.

MONDAY, May 26th.—10 A.M., Dr. Dowling: Skin Department. 11 A.M., Mr. Tyrrell Gray: Surgical Wards. 2 P.M., Mr. Simmonds: Surgical Wards.

TUESDAY.—10 A.M., Medical Registrar: Medical Wards. 2 P.M., Mr. Hamblen Thomas: Throat, Nose, and Ear Dept. 2.30 P.M., Sir Henry Simson: Gynæcological Operations.

WEDNESDAY.—10 A.M., Dr. Burnford: Medical Wards. 2.30 P.M., Mr. Donald Armour: Surgical Wards. Dr. Scott Pinchin: Medical Out-patients.

THURSDAY.—Closed.

FRIDAY.—10 A.M., Dr. Pritchard: Medical Wards. 2 P.M., Mr. Vlasto: Throat, Nose, and Ear Department. 2 P.M., Mr. Sinclair: Operations.

SATURDAY.—9 A.M., Mr. Vlasto: Throat, Nose, and Ear Operations. 9.30 A.M., Dr. Burnford: Bacterial Therapy Department. 10 A.M., Dr. Owen: Medical Children's Department.

Daily. 10 A.M. to 5 P.M., Medical, Surgical, and Special Out-patients, Operations, Ward Visits, Anæsthetic Courses.

NORTH-EAST LONDON POST-GRADUATE COLLEGE: Prince of Wales's General Hospital, Tottenham, N.

MONDAY, May 26th.—2.30 to 5 P.M.: Medical, Surgical and Gynæcological Clinics. Operations.

TUESDAY.—2.30 to 5 P.M.: Medical, Surgical, Ear, Nose, and Throat Clinics. Operations.

WEDNESDAY.—2.30 to 5 P.M.: Medical, Skin, and Eye Clinics. Operations. 4.30 P.M., Dr. W. N. Goldsmith: Bullous Eruptions. (Special lecture.)

THURSDAY.—11.30 A.M.: Dental Clinics. 2.30 to 5 P.M.: Medical, Surgical, Throat, and Ear Clinics. Operations.

FRIDAY.—10.30 A.M.: Ear, Nose, and Throat Clinics. 2.30 to 5 P.M., Medical, Surgical, and Children's Diseases Clinics. Operations.

NATIONAL HOSPITAL, Queen-square, W.C.

MONDAY, March 26th.—12 noon, Dr. Greenfield: Cerebro-spinal Fluid. 2 P.M., Dr. Riddoch: Out-patient Clinic. 3.30 P.M., Mr. Leslie Paton: Papilloedema.

TUESDAY.—2 P.M., Dr. Walshe: Out-patient Clinic. 3.30 P.M., Mr. Armour: Spinal Injuries.

THURSDAY.—2 P.M., Dr. Kinnier Wilson: Out-patient Clinic. 3.30 P.M., Mr. Julian Taylor: Ventriculography and Radiological Diagnosis of Cerebral Tumours.

FRIDAY.—12 noon, Dr. Purdon Martin: Anatomy and Physiology of Nervous System. 2 P.M., Dr. Adie: Out-patient Clinic. 3.30 P.M., Mr. Elmquist: Demonstration of Re-educative Methods. (In Exercise Room.)

ROYAL NORTHERN HOSPITALS POST-GRADUATE LECTURES.

WEDNESDAY, May 28th.—3.15 P.M. (at the Royal Chest Hospital, City-road), Dr. Ernest Fletcher: Electrocardiographic Diagnosis of Heart Disease.

ST. JOHN'S HOSPITAL DERMATOLOGICAL SOCIETY, 49, Leicester-square, W.C.

WEDNESDAY, May 28th.—5 P.M., Dr. Leonard Hill: Penetration of the Skin by Radiation. (Annual oration.) Annual dinner at Kettner's Restaurant at 6.45 for 7 P.M.

ROYAL DENTAL HOSPITAL OF LONDON SCHOOL OF DENTAL SURGERY, Leicester-square, W.C.

MONDAY, May 26th.—5 P.M., Dr. E. C. Rosenow, of the Mayo Clinic, Minn., U.S.A.: Post-graduate lecture on Elective Localisation of Streptococci following their Inoculation into the Teeth of Dogs.

UNIVERSITY COLLEGE, Gower-street, W.C.

FRIDAY, May 30th.—5.30 P.M., Prof. G. H. Parker, Professor of Zoology and Director of the Zoological Laboratory, Harvard University: A Public Lecture on The Secretory Action of the Nervous System.

MANCHESTER ROYAL INFIRMARY POST-GRADUATE COURSE.

TUESDAY, May 27th.—4.15 P.M., Dr. J. Shaw Dunn: Tertiary Syphilitic Lesions.

FRIDAY.—4.15 P.M., Dr. A. H. Holmes: Demonstration of Medical Cases.

GLASGOW POST-GRADUATE MEDICAL ASSOCIATION.

WEDNESDAY, May 28th.—4.15 P.M. (at the Eye Infirmary), Mr. W. B. Inglis Pollock and Dr. H. S. Martyn: Eye Cases.

Appointments.

HARRIES, D. J., M.D., B.S. Lond., has been appointed an additional Referee under the Workmen's Compensation Act for Barry and Cardiff County Courts.

PEARCE, JOHN D. W., M.B. Edin., D.P.M., Third Assistant Medical Officer and Assistant Pathologist at the City Mental Hospital, Humberstone, Leicester.

THOMPSON, S., L.M.S.S.A. Lond., Asst. Clinical Tuberculosis Officer, Leeds Corporation.

Certifying Surgeons under the Factory and Workshops Acts: BENNETT, A. W. C., L.R.C.P. Lond., M.R.C.S. (Swindon); JONES, M. W. (Llanybyther, Carmarthen); and WITNEY, E. W., M.B., B.S. Lond. (Whitstable).

Vacancies.

For further information refer to the advertisement columns.

Albert Dock Hospital, Connaught-road, E.—Res. M.O. At rate of £110.

Altrincham General Hospital, Cheshire.—Sen. H.S. Also Jun. H.S. At rate of £150 and £120 respectively.

Antrim County Council.—Chief Tuber. M.O. £750.

Bath, Royal United Hospital. H.P. £120.

Bath, Somerset, and Wilts Central Children's Orthopædic Hospital. H.S. At rate of £120.

Berkshire C.C.—Asst. Tuber. O. and General Med. Asst. £600.

Birmingham, Ear, and Throat Hospital, Edmund-street.—H.S. At rate of £150.

Birmingham, Selly Oak Hospital.—Cas. O. At rate of £200.

Bolingbroke Hospital, Wandsworth Common, S.W.—Res. M.O. £200.

Bradford, City of.—Locum Tenens. 12 gns. a week.

Brighton, Sussex Eye Hospital, Queen's-road.—Hon. Surg. Also Hon. Clin. Asst.

Bristol, Clifton Dispensary, Dawny-square.—Res. M.O. £300.

Cancer Hospital, Fulham-road, S.W.—H.S. At rate of £100.

Chelmsford and Essex Hospital.—Res. M.O. £150.

Chelsea Hospital for Women, Arthur-street, S.W.—Jun. H.S. At rate of £100.

Chesterfield and North Derbyshire Royal Hospital.—Cas. O. At rate of £200.

Chingford, Hospital for Infectious Diseases.—Res. M.O. £300.

City of London Hospital for Disease of the Heart and Lungs, Victoria Park, E.—H.P. At rate of £100.

Colchester, Royal Eastern Counties Institution for Mental Defectives.—Jun. Asst. M.O. £350.

Cumberland C.C.—Asst. County M.O.H. £600.

Derbyshire Royal Infirmary.—Asst. H.S. and Cas. O. £150.

Dreadnought Hospital, Greenwich.—Anæsthetist. 50 gns. H.P. and H.S. At rate of £110.

Elizabeth Garrett Anderson Hospital, Euston-road, N.W.—Med. and Surg. Regs. Each £100.

General Lying-in Hospital, York-road, Lambeth, S.E.—Res. M.O. At rate of £100.

Gloucestershire Royal Infirmary and Eye Institution.—H.P. and H.S. At rate of £135 and £100 respectively.

Great Yarmouth General Hospital.—H.S. £125.

Guildford, Royal Surrey County Hospital.—Res. Med. and Surg. O. and Reg. £250.

Halifax Royal Infirmary.—3rd H.S. At rate of £125.

Hampstead Council of Social Welfare, 27, Heath-street, N.W.—Two M.O.'s.

Hertford County Hospital.—H.P. At rate of £150.

Hospital for Epilepsy and Paralysis, Maida Vale, W.—Hon. Psychiatrist. Two Med. Regs. Also Clin. Path.

Hospital for Sick Children, Great Ormond-street, W.C.—H.S. Also H.P. Each at rate of £100.

Hull Royal Infirmary.—H.S. At rate of £150.

Islington Dispensary, 303, Upper-street, N.—Res. M.O. £220.

Kent Education Committee.—School Medical Inspector. £600. Also Dental Surgeon. £550.

King's College Hospital, Denmark Hill, S.E.—Jun. Urological Surgeon.

L.C.C. Administrative County of London.—Med. Supt. £1000. Venereal Diseases Clinic: Chief Asst. M.O. £600. Two Jun. Asst. M.O.'s. Each £350. Hospital Service: Asst. M.O.'s. £300–£400.

Leeds Hospital for Women.—H.S. At rate of £50.

Liverpool, Mill-road Infirmary.—Res. Asst. M.O. £200.

Liverpool School of Tropical Medicine, Pembroke-place.—Research Asst. £400.

Liverpool, Royal Children's Hospital.—Hon. Anæsthetist.

London Hospital, E.—Cardiographic Dept. Paterson Research Scholar. £400.

London Jewish Hospital, Stepney Green, E.—Cas. O. At rate of £150.

London Lock Hospital, 91, Dean-street, W.—Hon. Surgeon to Out-patients.

London University, Chair of Physiology.—£1000.

Manchester, Crumpsall Hospital.—Radiologist. £500.

Manchester Northern Hospital for Women and Children, Park-place, Cheetham Hill-road.—Sen. H.S. Also Jun. H.S. £130 and £100 respectively.

Manchester Royal Children's Hospital.—Sen. M.O. to Out-patients. £300. Asst. S. £50.

Manchester Royal Infirmary.—H.P. and H.S. Each £200.

Manor House Hospital, Golders Green.—H.S. £200.

Margate and District New General Hospital.—Res. M.O. £125.

Metropolitan Ear, Nose and Throat Hospital, Fitzroy-square, W.—Clin. Asst.

Miller General Hospital, Greenwich-road, S.E.—Pathologist. £600. Out-patient Officer. At rate of £150. H.P. and H.S. Each at rate of £125.

National Hospital, Queen-square, W.C.—Jun. Reg. £200 Also Asst. Phys.

Newcastle-on-Tyne, Royal Victoria Infirmary.—Hon. Asst. to Electrical and Massage Depts.

Northampton General Hospital.—Asst. H.S. At rate of £150.

Norwich, Norfolk and Norwich Hospital.—H.S. £120.

Nottingham General Hospital.—2nd Cas. O. At rate of £150.

Plymouth, City of.—Deputy M.O.H. £750.

Plymouth City Hospital.—Res. Med. Supt. £1000.

Prince of Wales's General Hospital, Tottenham, N.—Hon. Surg. Reg.

Princess Louise Kensington Hospital for Children, St. Quintin-avenue, N. Kensington, W.—Almoner.

Queen's Hospital for Children, Hackney-road, E.—H.P. Also Cas. O. Each at rate of £100.

Rotherham County Borough.—Asst. M.O.H., &c. £700.

Rotherham Hospital.—Sen. H.S. £200.
Royal Free Hospital, Gray's Inn-road, W.C.—H.P.'s and H.S.'s to Special Depts. Obstet. H.S. £150. Also District Obstet. Asst. £100. Res. Anæsthetist to Gynæcological Obstetric Unit.
Royal National Orthopædic Hospital, Gt. Portland-street, W.—Hon. Anæsthetist.
St. Bartholomew's Hospital, E.C.—Physician.
St. Mary's Hospital, W.—Surgical Registrar. £200.
Saint Pancras Dispensary, 39, Oakley-street, N.W.—Res. M.O. £185.
St. Thomas's Hospital.—Physician. Also Physician to Out-Patients Dept. Also Asst. Dental S.
Salford Royal Hospital.—H.P. Also Cas. H.S. Each at rate of £125.
Salford, Lancs., Hope Hospital.—Asst. M.O. At rate of £250.
Salisbury General Infirmary.—Two H.S.'s. £150.
Sheffield Children's Hospital.—3rd Res. M.O. £100.
Sheffield, Jessop Hospital.—Res. M.O. £175.
Sheffield Royal Hospital.—Res. Anæsthetist. At rate of £80.
Sheffield Royal Infirmary.—H.S. £80.
Southampton, Royal South Hants and Southampton Hospital.—Asst. H.S. and Cas. O. Each £180.
South-Eastern Hospital for Children, Sydenham, S.E.—Asst. and Res. M.O.'s. At rate of £100 and £75 respectively.
Southern Rhodesia Medical Service.—3 Asst. and Relieving Government M.O's. Each £500.
Sunderland Royal Infirmary.—Hon. Phys. £500.
Swansea General and Eye Hospital.—H.S., Cas. O. Also H.P. Each at rate of £150.
Talgarth, Breconshire, South Wales Sanatorium.—Asst. Res. M.O. £250.
Torquay, Torbay Hospital.—Physician for V.D. Clinic. 2 gns. per session.
Warwick, Warwickshire King Edward VII. Memorial Sanatorium, Hertford Hill.—Med. Supt. £800.
Weir Hospital, Grove-road, Balham, S.W.—Jun. Res. M.O. £150.
West London Hospital, Hammersmith, W.—Hon. Surg. H.P., H.S., Aural and Ophth. H.S. Also Res. Asst. Cas. O. Each at rate of £100.
Weston-super-Mare General Hospital.—Res. H.S. £130.
Weymouth and District General Hospital.—H.S. £180.
Winchester, Royal Hampshire County Hospital.—Sen. Res. M.O. £200. H.P. and H.S. Each £150.
Windermere, Ethel Hedley Hospital for Crippled Children.—Res. H.S. At rate of £150.
Wigan Infirmary.—3rd. H.S. At rate of £150.
Willesden General Hospital, N.W.—H.P. £100.

Births, Marriages, and Deaths.

BIRTHS.

COX.—On Saturday, May 17th, to Dr. and Mrs. Chave Cox, of 137, Hornsey-lane, N.6, the gift of a daughter.
HEARLE.—On May 13th, at Liskeard, Cornwall, the wife of Dr. H. N. Hearle, of a daughter.

DEATHS.

BALDOCK.—On May 16th, at Earl's Court-road, Alfred Baldock, M.B., aged 80 years.
BELL.—On May 13th, at Southernhay West, Exeter, Charles Edward Wallace Bell, M.R.C.S., L.R.C.P., aged 77.
LUND.—On May 12th, at Germiston, South Africa, Theodor Lund, M.D.
O'GORMAN.—On May 11th, at a nursing home, Dublin, Colonel C. J. O'Gorman, D.S.O., R.A.M.C., of Warriston, Glenageary.
RICHARDS.—On May 14th, at his residence, St. Thomas'-street, Winchester, Thomas Decimus Richards, M.R.C.S.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages and Deaths.

ESSEX PUBLIC MEDICAL SERVICE.—The (sixth) annual report for the year 1929 shows that the service increases in numbers and in financial stability. On the last day of the year, after deducting cancellations, removals, and deaths, there were 8573 books on which payments were being made, representing 16,750 subscribers (7985 adults and 8765 children). Owing to death or retirement eight doctors were taken off the books and eight new members were admitted, leaving 176 names on the books at the end of the year (127 on the active and 49 on the honorary list).

The total amount paid to doctors shows an increase of £646 over that paid in 1928. The average amount paid per person works out at 10*s.* 1*d.* The three largest totals collected for individual doctors in each class of district were: metropolitan, £384, £287, £259; urban, £766, £651, £471; semi-rural, £247, £237, £125; rural, £253, £161, £105. Collectors who work on a 15 per cent. commission basis have performed their duties with very little friction; arrears at the end of a quarter average under one-half per cent. of their books, the greater portion of which is collected by instalments in the following quarter. Assets of the service exceed liabilities by £153; the balance-sheet for 1928 showed an excess of liabilities to the extent of £132—an improvement of £285; it is now proposed to pay off a loan from the B.M.A. of £200; the balance of £50 on doctors' loan; and a grant of £50 to the benevolent fund, which supplies bandages, belts, stockings, and other appliances.

Notes, Comments, and Abstracts.

COLLECTION AND DISPOSAL OF REFUSE.

A CHADWICK public lecture was given at the Royal Sanitary Institute and Parkes Museum on May 15th, by Mr. Edward Willis, borough engineer of Chiswick, and chairman of council of the Institute. Refuse, he said, was of three sorts—domestic, trade, and street refuse; originally everything was thrown into the streets where it remained until carted away as manure. The first real improvement was the provision of underground sewers to take the place of open gutters. House refuse which consists of night-soil, rags, ashes and food debris, varies in bulk and weight, in mining districts being three times the weight it is in a southern town, and in summer only half what it is in winter. Metal food-containers provide a problem unknown fifty years ago and empty bottles used for beer, milk and mineral waters are liable to injure employees unless great care is taken. Of all these the debris of food is the most important, for it breeds flies unless collected at least once a week. Next comes trade refuse—cotton waste, rags, grease, carbide waste, paper, wood chips, fish offal—for whose removal the trader should pay. Lastly there is the street refuse, greatly reduced now that horses are 90 per cent. fewer and pneumatic tyres wear less dust off the roads, which are besides better made and surfaced. "But too much litter of paper is left on the streets," said Mr. Willis. "In Germany this is a punishable offence."

Collection of rubbish can only be made in the early part of the day in busy towns, but in residential suburbs throughout the morning. If the shoot (or dump) is within a mile, horse haulage is good; if it is at greater distances motor, rail, or barge transport is required. Refuse is best collected in dust-bins of municipal pattern, placed on the pavement by the occupier and emptied by a strong staff into a slowly passing motor which is covered, as in Westminster. Daily collection is an economy, and much more efficient.

Going on to speak of the disposal of rubbish, Mr. Willis said that dust-heaps were soon found to breed flies, crickets, and rats, and this led to the use of destructors. Even sewage sludge may be burned in these, and the clinker thus formed makes the better cement. Rubbish must be sorted before being put into destructor. There is the risk of bombs, live cartridges, &c., and tins have to be picked out and baled, after which they sell for perhaps 22*s.* a ton. Iron nails and wire are extracted by electro-magnets and sold separately. Fine dust, sifted out, is used for burning bricks, and in Southwark rubbish is "pulverised" to make manure. "Controlled tipping" (as at Bradford and elsewhere) is satisfactory in suitable places. A site which can be improved is covered to a reasonable depth with rubbish, and this is covered with nine inches of good vegetable soil. The temperature rises to 150° F., and in six months the refuse has become harmless and odourless. Suitable sites are needed, also proper soil and capable and zealous workmen. In the method of salvage, highly developed at Birmingham[1] and Marylebone, the driving principle is the proper utilisation of all waste material, just as in controlled tipping the object is to make the best of waste places.

In the course of his lecture Mr. Willis gave the following figures for the London cleansing services: Area, 117 square miles; population, 4,612,000; approximate cost, £2,200,000 per annum; averaged rate for public cleaning, 11d. in the £1; staff, 8500 persons; amount collected, 1,200,000 tons.

THE MANUFACTURE OF SULPHURIC ACID.

THE importance to chemical industry of an efficient manufacture of sulphuric acid lies in the fact that it is perhaps one of the most widely used of inorganic chemicals; besides being required for the production of artificial fertilisers, such as sulphate of ammonia and super phosphate of lime, it is employed in the manufacture of soda by the salt cake process, and thus in the manufacture of hydrochloric acid as well as in that of practically all other acids, both inorganic and organic; in addition it is employed as a sulphonating, condensing, and oxidising agent in the manufacture of many organic chemicals. In view of these facts it is not surprising that the study of the underlying theory of the methods of production with a view to improvement of yield have received much attention, the results of which are incorporated in many bulky text-books. A volume recently published[2] is to be welcomed on the ground that it contains in small compass all that the ordinary student of applied chemistry needs in the first instance

[1] THE LANCET, 1929, i., 456.

[2] Sulphuric Acid and Its Manufacture. By H. A. Auden, M.Sc.Vict., D.Sc.Tübingen. London: Longmans, Green and Co. 1930. Pp. 231. 16*s.*

references to larger books and original papers being supplied. It is common knowledge that there are two main processes employed in the manufacture of sulphuric acid, the older leaden chamber process depending upon the action of oxides of nitrogen in effecting the oxidation of sulphur dioxide to the trioxide, while the contact process relies upon contact catalysis to affect this change. The material used as catalyst in the early stages of the contact process was invariably platinum, whose efficiency compares with other materials since employed, such as iron oxides, shown by the fact that about 25–30 tons of this cheaper material are required to do the work of 4–5 lb. of platinum. The contact process alone can produce fuming sulphuric acid, and the demand for this material during the war necessitated increasing the production in the United Kingdom from 30,000 tons to 450,000 tons per annum.

EXPERIMENTAL PHONETICS.

THE first meeting of the International Society of Experimental Phonetics is to be held at Bonn from June 10th to 14th, when lectures will be given by experts from various European countries, including Prof. E. Blancquaert (Ghent), Prof. P. Fouché (Strasbourg), Prof. M. Isserlin (Munich), Prof. H. Pernot (Paris), Prof. E. W. Scripture (Vienna), and Prof. E. W. Selmer (Oslo). From England, Mr. R. T. Beatty (Teddington), Frl. Janvrin, and Mr. Stephen Jones (London) are taking part. Apparatus for film projection and an epidiascope are at the disposal of lecturers, and there will be an exhibition of apparatus of all kinds which it is expected will interest physicists, doctors, dentists, linguists, philologists, psychologists, and pedagogues as well as phoneticists. Inquiries are to be addressed to the Phonetic Institute of the University of Bonn, Poppelsdorfer Allee 25, or in London to the Secretarial Bureau of the International Society at 73, Welbeck-street, W. 1. With the announcement of the meeting reaches us a notice of the *Zeitschrift für Experimental-phonetik*, edited by Prof. Scripture, as the organ of the society. The journal—of which the first number will appear on June 1st—is the official intelligencer of institutes and laboratories in 10 or 12 countries. Membership of the International Society costs 10 marks yearly and entitles the member to receive the *Zeitschrift*.

INVALID CHILDREN'S AID ASSOCIATION.

AT the recent annual meeting of the Association, held at 18, Carlton House Terrace, under the presidency of Lord Goschen, Mr. H. S. Souttar remarked on the enormous development in effectiveness of both medicine and surgery which had taken place in the last 40 years. In his own student days large numbers of children suffering from surgical forms of tuberculosis were seen in hospitals; these cases had now virtually disappeared. The Association's work, however, was growing with the growth of London, and there were 39 branches in London, in addition to the central depôt. The service given depended essentially on personal help, and an increased number of trained workers were needed to deal with the extra cases. Lieut-Col. F. E. Fremantle referred to the beneficial effect which the Local Government Act might have on the work of the Association. (1) The system of one block grant from the State to local authorities would enable the authorities to budget in proportion to the various requirements; (2) a shrewd arrangement had been devised by which the more needy districts would receive the larger grants; (3) the Government had prepared in great detail a maternity and child welfare scheme for London, and it was a duty of all local authorities to submit a scheme, and to make use of voluntary organisations, stating what their contributions to them were to be; (4) an improvement in the provision for mothers and children should be affected in the course of the next ten years, by the reorganisation of institutions formerly under boards of guardians.

PUBLIC LODGING-HOUSES FOR WOMEN.

To the Editor of THE LANCET.

SIR,—I should be grateful if you would once more permit me to draw your attention to the progress of Cecil Houses. On Friday, May 30th, at 3 P.M., we are holding a public meeting at the Shaftesbury Theatre (by kind permission of Mr. Tom Miller and Basil Foster) to raise further funds. We have already three houses established and are opening a fourth very shortly, where for a shilling a night a homeless woman can get a good bed, hot bath, tea and bread and butter, and no questions are asked. We can accommodate 160 women and 34 babies every night—the charge for a cot is 3*d*.—but these resources do not nearly meet the perpetually increasing demand for beds consequent on the continual stream of women from the provinces and those thrown on the street through the housing shortage. Every night women—some of them with young children—have to be turned away through lack of room. If we are to start another house before next winter, we must raise the money required for the purchase of freehold, reconstruction, and equipment. Once the initial cost has been met, each house is entirely self-supporting, paying its own way on the shillings received nightly. Lieut.-Colonel Robert Loraine, D.S.O., is taking the chair for us, and the speakers will include Miss Marion Lorne, Miss Ellen Wilkinson, M.P., Dr. Morton (Governor of Holloway Prison), Mr. R. C. Sherriff, and Major J. Brunel Cohen, M.P. Tickets of admission to the meeting can be obtained (free) on application to me at Cecil Houses (Inc.), 11, Golden-square, London, W.1.

I am, Sir, yours faithfully,

A. E. CHESTERTON,
May 19th, 1930. Hon. Organising Secretary.

HEALTH REGAINED IN SOUTH AFRICA.

To the Editor of THE LANCET.

SIR,—I am writing in the hope of bringing a ray of hope to some of my fellow countrymen. About 37 years ago I had an attack of pleurisy while living in Hampstead, followed about two years later by hæmorrhages, culminating in breaking down of lung tissue, in short, tuberculosis—a common history. Sir Douglas Powell advised South Africa with the usual reservations in regard to comfort and altitude. I arrived in Natal and found the coast climate there worse than in England. I quickly found it was necessary to live above what is called in Natal "the mist belt," and proceeded to East Griqualand, about 5000 above sea-level, where I improved rapidly but still had the painful adhesions. After another short period in Natal, with a recrudescence of symptoms, I came to the Orange Free State where I am now farming and capable of a good day's work. I look and feel robust and adhesions are a thing of the past. People not too strong in the chest are frequently sent to Switzerland, but it is necessary for them to go where they will not only regain health but find a means of livelihood at hand. I live five miles from the nearest village, 16 miles from the railway. There is a telephone on the farm; the scenery is glorious, plenty of near neighbours, good motor roads, and every convenience. Land costs about £5 an acre and 500 to 1000 acres with sheep, dairy, and the usual agriculture are ample to support a family. There are cheese factories in plenty to send the milk to. I hope this letter may help some people to realise that South Africa is no longer the back of beyond.

I am, Sir, yours faithfully,

April 20th. H. H. T.

NEW PREPARATIONS.

CAROTENE.—We have received from the British Drug Houses, Ltd., Graham-street, City-road, London, N., a sample bottle of 50 pellets of carotene, which, as a source of vitamin A, has been brought forward prominently in connexion with the work of Prof. Edward Mellanby and Dr. H. N. Green. Each pellet contains 2 mg. of pure crystalline carotene in stable combination. Carotene is widely present in various foodstuffs, but this preparation has been put up in convenient form in order that medical men who desire to submit it to clinical trial may do so by administering it by itself. In THE LANCET recently (April 26th, p. 925), in referring to the work of Mellanby, it was pointed out that within the last two years the whole question of the relation of carotene to vitamin A has come under consideration, and there is now no conflict of opinion that purified carotene can act as a vitamin, though exactly how this occurs has not been ascertained.

SOLUGA (Savory and Moore, Ltd., and John Bell and Croyden, New Bond-street, and Wigmore-street, London, W.).—This preparation, which is put on the market as a concentrated food tonic, contains in definite proportions hormones, albumins, and lipoids derived from the liver, heart, brain, thymus, and central nervous system, combined with stable forms of vitamins, vegetable proteins, and maltose and grape sugar. The preparation is manufactured in Germany, and on the small tins in which it is supplied there is printed a full analysis of the contents. The drug can be taken dry, or followed by water, milk, or cocoa, or mixed with those liquids in indicated doses, but overheating, it is easy to see, would destroy some of its properties, and a warning is given to that effect.

OPOCALCIUM.—From the Continental Laboratories, Ltd., 17, Lower Belgrave-street, London, S.W., we have received a specimen box of 50 tablets (comprimés), containing parathyroid, suprarenal, and thymus extracts in combination with, among other things, calcium and magnesium. There is clinical evidence that the regular use of these tablets has been of service in the debility which follows overwork or which is marked in the convalescing stages after long illness. The doses are regulated according to the age of the patient and the persistence of the symptoms.